THE BRITISH JOURNAL

OF

OPHTHALMOLOGY

MAY, 1945

COMMUNICATIONS

OPHTHALMOLOGY IN LAGOS, 1943

BY

R. WALKINGSHAW

COLONIAL MEDICAL SERVICE

THE Eye Clinic in the African Hospital, Lagos, was opened on December 7, 1942, and its inception was made possible when I became available for service in Nigeria as I had the necessary qualification, but what is more important I had the time to devote to such a clinic. The war had so brought it about that I was posted to Nigeria and on my arrival in November, 1942, I was asked to take the teaching of anatomy in the Medical School (a part-time post) and to run an eye clinic to fill up the remainder of my daily routine time-table. Before the date of my arrival, there had been no eye clinic as a separate entity in the out-patient department, and any ophthalmic patients who attended were seen in the ordinary way by that Assistant Medical Officer (African) who happened to get the case. If any difficulties arose, the patient was referred to one or other of the European staff, but no one of the staff had devoted any great amount of attention to the study of ophthalmology and these cases were seen in the ordinary course of their routine work. Some few years ago, the Senior Medical Officer then stationed at Lagos had been interested in ophthalmology, and he devoted considerable time to it, but this was very much of a side line, and he has informed me that he saw only those cases which were referred to him by other members of the

Medical Department, and that he did not run an eye clinic which was open to all who cared to apply directly to it for attention.

As a result of all this the accommodation, which had been reasonably adequate for what was required of it in time gone past, had been taken over for other activities in the hospital, and the equipment, which had at no time been adequate, had to a large extent perished from disuse or had been transferred to other stations in the country where more or better use might be made of it. The impossibility of obtaining fresh equipment has made the present position extremely difficult and the supply of drugs necessary for a thriving Eye Clinic has been quite inadequate through no fault of anyone connected with such supplies, but merely because abnormal demands have been made upon the normal supply.

Staff for the proposed Eye Clinic was provided in the shape of a part-time nurse, but it soon became obvious that this was quite inadequate, and the work could not have gone on if some voluntary help had not become available soon after the clinic was opened.

Almost all the patients seen in the clinic have been African, and the number of Europeans who have had attention has been so small that their inclusion in the figures does not vitiate the results when these are taken as a survey of ophthalmic conditions in West Africa; most of the Europeans attended for correction of refractive errors and only about four have attended for pathological conditions and in the following comments these will usually be ignored.

During December, 1942, the cases attending were to a large extent referred from the out-patient department, or from the school clinic, but very soon the general population of Lagos and district learned of the existence of the Eye Clinic and patients began to appear of their own accord, coming direct to the Clinic.

In view of the small part of my time which the Clinic was expected to occupy, arrangements were made to hold it in the late afternoons, but by early January, 1943, the increase in numbers had been so great that re-organisation was necessary, and from that time onwards, the Clinic was held daily in the mornings and was considered to be the major and by far the most important part of my official daily duties, while the teaching of anatomy became very much a part-time effort and preparation of the anatomy lectures, dissections, etc., had perforce to be done in what should have been my spare time, in the evenings.

From January onwards the numbers have progressively increased, and by the end of February, there was so much to be done that less essential work had to be curtailed, and the decision was made that routine refractions in school children would have

to be postponed until more trained assistance became available. The reason behind this was that the supply of spectacles in West Africa was quite unequal to the demands which might be made upon it and there was no hope whatever of obtaining supplies for the mass of school children who required spectacles. Only those cases in which the child's health was being seriously interfered with were considered, and further, most of the routine work among the school children had to be returned to the school clinic.

The annual report of the Eye Clinic has been submitted to the Director of Medical Services in the form desired by the Department (Table I) and will, no doubt, appear in due course in the

TABLE I

Figures for ophthalmic outpatients for 1941, 1942 and 1943, according to the reports submitted officially to the Director of Medical Services.

	1941	1942	1943
(*a*) Cataract	19	27	94
(*b*) Conjunctivitis	423	1,123	452
(*c*) Ectropion, Entropion ...	Nil	Nil	12
(*d*) Refractive Errors ...	Nil	Nil	852
(*e*) Glaucoma	Nil	1	72
(*f*) Iritis	2	1	18
(*g*) Keratitis	6	5	64
(*h*) Pterygium	2	3	46
(*i*) Trachoma	2	6	91
(*j*) Ulcer of cornea, Staphyloma, Leukoma	8	28	94
(*k*) Others	39	182	1,410
	501	1,376*	3,205

* This total includes 160 cases seen by myself in the Eye Clinic during December, 1942.

Colonial Office Medical Reports, but as it gives very little information of ophthalmological value, further details are now submitted for publication. For the sake of comparison the figures for 1941-42 have been extracted from previous annual reports, and have been placed beside the figures for 1943. An abnormal increase in the figures for 1942 occurred from July onwards, and this suggests that someone had been attached to the hospital who was taking more interest in ophthalmology than had been done before.

In compiling these figures for 1943 no patient has been counted twice, so that the figures merely represent the number of patients seen, and not the number of conditions which were diagnosed. In every case, the primary disease, so far as could be ascertained, has been listed, and any other subsidiary condition which might have been discovered during examination has not been entered in the figures, not even recurrences have been entered, but the comments following the reclassification will amplify these.

TABLE II

Classification of Patients attending in 1943

				Totals	Per cent.
A	Diseases of the Lids	Meibomian Cyst	32		
		Hordeolum	72		
		Others	15	119	4
B	Diseases of Lachrymal Apparatus	Dacryocystitis	5		
		Others	5	10	—
C	Diseases of Conjunctiva	Conjunctivitis	452		
		Spring Catarrh	12		
		Trachoma and all its results	91		
		Pterygium	46		
		Others	1	602	19
D	Diseases of the Cornea	Keratitis	64		
		Ulcer	39		
		Late results of both	55		
		Others	1	159	5
E	Diseases of the Sclera	Episcleritis	33		
		Others	2	35	1
F	Diseases of the Uvea	Iritis	18		
		Cyclitis	123		
		Choroiditis	25		
		Late results of all three	15	181	6
G	Diseases of the Lens	Cataract, Senile	85		
		Congenital	7		
		Others	2	94	3
H	Diseases of the Retina	Retinitis	1		
		Glioma	2	3	—
J	Diseases of the Optic Nerve	Neuritis	2		
		Atrophy	2	4	—
K	Diseases of Tenon's Capsule	Tenonitis	2	2	—
L	Diseases of Orbital Tissues	Tumours	1		
		Cellulitis	6	7	—
M	Unclassified States of the Eye	Glaucoma, acute	2		
		" chronic	70		
		Panophthalmitis	4		
		Others	4	80	3
N	Vascular States	Arteriosclerosis	3	3	—
O	Systemic Diseases	Whooping Cough	7		
		Syphilis	16		
		Migraine	2		
		Others	19	44	1
P	Diet Deficiency Diseases	Hypo-vitaminosis	518	518	16
Q	Parasitic Diseases	Loa Loa	10		
		Onchocerciasis	4	14	—
R	Injuries	F. B. Cornea	113		
		Accidental	201		
		Assault	49	363	11
S	Errors of Refraction	Hypermetropia	107		
		Myopia	223		
		Presbyopia	334		
		Astigmatism	142		
		Others (mostly amblyopia and asthenopia)	46	852	26
T	Muscle Imbalance	Squints	4	4	—
U	Routine Examinations	School Children	37		
		Government Servants	36		
		Members of H.M.F.	10	83	2
V	Defaulted before examination completed, or not in above classification			28	1

It will be obvious to those acquainted with ophthalmology that the mass of patients classified in 1941 and 1942 as suffering from conjunctivitis must have included all that conglomerate group of cases in which a congested red eye was the predominating sign. Similarly in 1943 the huge number under " Others " is much too large to be passed over without further dissection and it is primarily for this reason that the following presentation is made. Table II shows an amended classification of the 3,205 patients, so as to convey some information of value to ophthalmologists, and to those who might be interested in Ophthalmological work in West Africa. The percentages have been calculated to the nearest round figure, but in these cases where it is very small, no percentage has been entered.

Many of the patients are quite uneducated, are so poor and live in such unsuitable surroundings that they are unable to carry out even the simplest treatment. Many of them were quite incapable even of applying drops to the eye. Wherever possible, these patients were brought back to the clinic for daily attention, and frequently the dressings which were performed in the Clinic were the only attention that the pathological states received. This all increased the work to be done in the Clinic and by the end of the year well over 20,000 attendances had been given.

In addition to the regular clinic a separate session has been held once a week at which all candidates for posts in Government service were examined. No careful tally of these was kept, but taking individual weeks scattered throughout the year as average samples, the number is computed to be just over 2,000.

Comments on Table II

B. *Diseases of the lachrymal apparatus.* Dacryocystitis.—Four of these cases were in children between the ages of 10 and 16, and all of them had concomitant septic nasal conditions. In two cases which came to operation, there was obvious extension from the anterior ethmoidal sinus. The conjunctival sac seemed above suspicion and there was no history of conjunctivitis.

C. *Diseases of the conjunctiva.* Conjunctivitis.—A half-hearted attempt has been made to find the exact bacteriological flora in cases of conjunctivitis, but shortage of staff, both in the Eye Clinic and particularly in the Pathological Department has made the result unsatisfactory, and no figures can be quoted at present for the various organisms which might be found in conjunctivitis. In many cases secondary infection by staphylococcus was found, and this swamped the primary causative organisms. It has been remarkable, however, that in only a very few instances has the diplobacillus of Morax-Axenfeld been discovered, and it is quite rare to find a Koch-Weeks infection, either clinically or bacteriologically.

Spring Catarrh.—Spring catarrh has been seen affecting the lids in only two cases. In the remainder it has been the limbal type, and in one or two cases it was so gross as to cause difficulty in diagnosis.

Trachoma.—The number of trachoma cases was sufficient to warrant having a special session for trachoma treatment to avoid risk of conveying the disease to other patients in the clinic, and also to enable these trachoma patients to continue their treatment while following their normal occupation. This session is held in the late afternoon so that patients may attend either on their way from work or after they have had their afternoon meal. It is rare to find patients with the early stages of trachoma, and most of these suffer from secondary infection. The majority of the patients come for treatment of exacerbations of the acute stage. Quite a few presented themselves with a well established pannus, which had spread over most of the cornea, and it was not unusual to find entropion, even up to extreme degrees, which shows that trachoma must be more common in Southern Nigeria than figures for the active condition indicate.

Pterygium.—Pterygium is an extremely common condition in Lagos, but it has been easily amenable to simple operations for its cure, and in only one patient has a recurrence taken place and this occurred three times after various operations. It was found, however, that the patient himself had brought about the recurrence because he admitted later that he had been giving the eye massage through the lids on each occasion immediately following the removal of the stitches in an attempt to reduce the swollen nodule and to hasten the improvement in the appearance of the eye. This forced out the flap from its final position, and left the way clear for the pterygium to extend forward over the cornea again.

D. *Diseases of the cornea.* Keratitis.—Many types of keratitis have been seen in the clinic, but not a single case of syphilitic interstitial keratitis has been found, and this in spite of the high incidence of venereal infections reported among the general out-patients and in the venereal clinic.

Ulcer.—Most of the ulcers have been of the simple staphylococcal type, very rarely perforating, and have usually caused no great trouble in treatment. It has been remarkable that only two cases of dendritic ulcer have been seen, and these were both in Europeans. Not a single case has been seen in Africans. Limbal ulcer is fairly common, and has proved to be extremely stubborn.

Late results of both.—A considerable number of patients presented themselves with leucomata, most of which were deep seated in the cornea, and quite a fair number had an iris incarceration in the scar. Although nothing could be done to cure the condition, many of these patients have asked to have something done

to hide the intensely white scar on the front of the eye, which is normally almost black in appearance (even the sclera is definitely tinged with dark brown pigment). These leucomata lent themselves to tattooing, but unfortunately the supply of suitable agents for tattooing was very small and was soon exhausted and no further supplies have been forthcoming owing to the war. The results of tattooing using gold chloride were satisfactory, but at times the stain was not dark enough to match the very dark African eye.

F. *Diseases of the uvea.* Iritis.—Frank, simple iritis is not at all common as a primary condition, but a few cases do occur and occasionally patients presented themselves with all the late signs and sequelae of previous severe attacks of iritis. Pigment deposits on the anterior lens surface are not uncommon, but my impression is that posterior synechiae are not nearly so common as in European countries, and this in spite of the frequency of corneal ulcers.

Cyclitis.—This is by far the most common affection of the uveal tract. It usually is of a mild type, and affects only a small section at a time, but it tends to be recurrent and eventually affects most of the ciliary body. Individual attacks, although mild, are very stubborn; they rarely clear up without vigorous treatment with atropine, and a pad and bandage have been found almost essential. If the pad is not applied the case runs a more prolonged course.

Choroiditis.—The number of these cases as shown in the tabulated list is far too small to give an indication of the actual number of cases which have been found to be suffering from choroiditis. Few patients come complaining of the choroiditis, and many cases have been discovered during the routine fundus examination of eyes with errors of refraction, and as the patient's primary complaint has been dimness of vision due to refractive error, these cases in which choroiditis has been discovered have not been listed as choroiditis unless refractive error was negligible, and the choroiditis was obviously the main cause of disability. This comment also applies to several other conditions such as cyclitic exudates and minor lens changes, because it must be borne in mind that the figures given in Table II are a record of the patients seen, and not of the separate pathological conditions which have been discovered during investigation.

Late results of all three.—Further evidence that cyclitis is the principal affection of the uveal tract in Lagos is found in this group, where fine deposits are frequently found on the posterior surface of the lens. In some cases the exudate has gone on to a complete cyclitic membrane so as to interfere seriously with visual acuity. During routine ophthalmoscopic examinations, it is not uncommon to find small scattered deposits on the posterior

lens surface especially towards the periphery, and these interfere only slightly with vision—the main disability arises from the involvement of the ciliary body itself.

G. *Diseases of the lens.* Cataract.—A fair number of typical bilateral senile cataracts have presented themselves, but there has been a striking proportion of uni-lateral well established cataracts in patients aged 30 years, and upwards. None of these patients give any history of injury, and it is very rare even to find a history of previous inflammatory infection. The iris is almost invariably quite free and the cataract has always the appearance of a simple senile cataract. This unilateral type occurs at a much earlier age than in Europe, and it appears to progress very much more slowly, because the history of diminution of vision in these cases extends over many years, and it is unusual to find any of these cataracts presenting a fully mature appearance. Very few of them have been sufficiently advanced to warrant operation, and the mentality of the patient usually is such that he is unwilling to undergo an operation for the removal of the cataract, unless a promise can be made that good vision will be restored and the eye be brought into full use in conjunction with its normal fellow. Without having any scientific grounds for the statement, it appears to me that this condition may be closely related to deficiency of diet which is extremely common in this country.

H. *Diseases of the retina.* Retinitis.—It is most remarkable that not a single case of retinitis of diabetic or of nephritic origin has presented itself during the whole year, and in no single case was any evidence of these types of retinitis found in the routine examination of other cases. It is difficult to suggest that diabetes and nephritis are not common conditions in this country, where the general state of health is frequently remarkably low, but it is quite possible that the general level of what the African considers good health is so low that the added burden of diabetes or nephritis counts for little, and is not worthy of consideration. Or it may be that since normally neither diabetes nor chronic nephritis causes any constant outward signs which are easily recognised, the patient's attention is not drawn to the systemic disturbance. (Reference to the annual report of the Medical Department of Nigeria will show the tremendous incidence of malaria, sleeping sickness, helminthiasis and many other debilitating tropical diseases.) However, in spite of this, I consider that at least a few might have come complaining of diminution of vision arising from retinitis, but in no single case have exudates or haemorrhages been discovered.

J. *Diseases of the optic nerve.* Neuritis.—This is very much in keeping with the state of affairs found in retinitis. No case of papilloedema or frank optic neuritis has presented itself.

Atrophy.—This is an extremely common condition and it would appear to arise without previous papillitis. The causes are varied, but I consider that the great majority are due to avitaminosis. All stages of this condition have been found, from those which show only very slight pallor of the temporal segment of the disc, up to almost complete optic atrophy, with only a tiny nasal segment remaining unaffected and even that is pale in colour. All these cases, however, are classified under dietary deficiency, and only those cases which are considered to be primary optic atrophy (initial cause not discovered) are entered under this heading. A few cases were seen in which the optic atrophy was extremely suggestive of tabes, but it has been rare to find the results of the Kahn Test positive and facilities for doing a cerebro-spinal fluid examination are not adequate, so that this has never been carried out in connection with work in the Eye Clinic. Both the laboratory staff and the physician are much too busy in their own spheres to be asked to carry out examinations of these patients in whom ultimate diagnosis is primarily of academic interest as the atrophy has usually proceeded to such an extent that no amelioration of the condition can be expected or even hoped for.

M. *Unclassified states of the eye.* Glaucoma, acute.—Only one case of acute congestive glaucoma in an African has been discovered, and that was an acute congestive attack super-imposed on a very well established long standing chronic glaucoma. The other case was in a Chinaman who arrived as the member of the crew of a ship calling at the port.

Glaucoma, chronic.—Unfortunately, this is a comparatively common complaint, and still more unfortunately the African often tolerates serious interference with his vision before he seeks relief, so that most of these patients come when the disease has been fully established, when the fields of vision have contracted to a small circle of 10-20 deg., and when the degeneration of the optic nerve has progressed so far that there is no hope of improvement. Most of the cases are in comparatively young people, starting at the age of 20 years, and reaching its maximum around 35 years. The course of the condition is usually a steady deterioration after the patient comes to the Eye Clinic, and as a number of the patients refuse operative treatment to begin with, the rate of progress is all too easily seen, and consent for operation comes when it is of little use. While no definite cause of glaucoma has yet been established, the influence of the mental state of the patient has always appeared to me to have some bearing on the condition. The more worrying the patient is in type and the more he is subjected to mental stress, the more progressive is the glaucoma. The African is often childish to a high degree, but he has lost the child's sense of complete abandon, so that he is beset eternally with a multitude

of worries and anxieties. As soon as he achieves even a moderate degree of education, he realises his other shortcomings and his incapacity to maintain a position which he would like to hold. This leads to a continual striving which is both ineffectual and ineffective, and of this he is fairly conscious, and so he lives under considerable mental stress. Among the females the primary worry is connected with matrimonial affairs and relationships, and this pervades their whole life from late girlhood since few of them have achieved any great degree of enlightenment.

O. *Systemic diseases.* Syphilis.—Although syphilis is considered to be a very common disease in the general population, its signs and symptoms in ophthalmological practice are comparatively uncommon. Even in those cases in which the signs are suggestive, a Kahn test often proves negative, and this is all the more remarkable since Yaws is a very common condition and frequently leads to mistaken diagnosis where too much reliance is placed upon the laboratory examination.

P. *Diet deficiency diseases.* Dietary deficiencies are many and varied in this country. In the southern part of Nigeria, the ordinary diet of the people is predominantly carbohydrate and comparatively small quantities of green vegetables and extremely small portions of protein are consumed. All the staple articles of diet which are preferred by these people are extremely poor in all the vitamins, with the exception of A, which is consumed in large quantities in the form of palm oil, ground nuts and their oil. Signs of Vitamin B deficiency are very common but usually take the form of cheilosis and other skin manifestations and the signs of lack of riboflavin as described by Sydenstricker are very rare here. I have seen only one case—a well established one in an old man of 60 years—and the patient made an excellent and rapid temporary recovery under treatment with a small quantity of riboflavin that had become available but the condition recurred when supplies ran out and it was some little time before improvement was brought about by yeast. Very commonly among the Africans there is a crescent of gray haze around the upper limbus tapering off at 10 and 2 o'clock and extending on to the cornea for a variable distance—sometimes as much as 2·5 mm. and at times appearing also as a small crescent on the lower cornea from 7 to 5 o'clock. Recently I have become inclined to consider this a possible sign of chronic deficiency of riboflavin. Owing to the lack of a slit-lamp in Nigeria the exact nature of this haze has not been investigated but it seems to me that it is possibly a chronic and less acute stage of the condition described by Sydenstricker. Some discussion on the intra-ocular signs of ariboflavinosis has already taken place in a previous report by Fitzgerald Moore, but I personally rather look upon the cause

of these signs with some doubt, and am of the opinion that the condition of optic atrophy associated with avitaminosis is much more likely to be due to a deficiency in vitamin B1. On this question a separate paper is under preparation; the main symptoms are, extremely slow and deliberate reading of the test type, the patient obviously concentrating on individual letters each one at a time but eventually reaching 6/12 or even 6/9, dimness of vision in bright sunlight, and fatigue when working in artificial light; the outstanding characteristic is an optic atrophy which may present itself in any degree from a slight pallor of the temporal segment, up to an almost complete pale disc with only a small remaining pink nasal segment. The pallor is never so intense or complete as in tabetic discs, or in those of primary optic atrophy, and it is usually accompanied by changes at the macula.

Q. *Parasitic diseases.* Onchocerciasis.—Four cases have been listed under this heading, but I feel very considerable doubt as to the correctness of the diagnosis, which was come to by exclusion rather than by positive reading of the signs and epiphenomena (Manson-Bahr, 11th Edition, Page 786) which can be due to a variety of other more common diseases.

R. *Injuries.* Foreign bodies of cornea.—There is very little industry in the country, and the foreign bodies have all been of a comparatively simple nature, such as emery or iron particles from grinding wheels. Most of the working classes are employed as mercantile assistants, petty traders, porters, labourers and in carrying out minor repairs to ships entering the port. The only large workshops maintained are those of the Public Works, the Marine and the Railway Departments of the Civil Government, and in these workshops considerable engineering processes are taken in hand, but the total number of people employed is comparatively small. No protective goggles are worn, and in a few cases where attempts have been made to introduce them, the African has been rebellious and has refused to employ them.

Accidental.—This heading includes all accidental injuries, other than foreign bodies of the cornea. Intra-ocular foreign bodies are extremely rare and no new case has presented itself during the year. Only two patients with late results have been seen and in these the eye has been destroyed. Many of the accidental injuries are minor and arise from the general carelessness, irresponsibility and lack of appreciation of danger in the ordinary activities of everyday life.

Assault.—These are chiefly simple black eyes, subconjunctival haemorrhages, etc., but in a few instances where the assault has been more severe, usually from a blow with a fist on the eye ball, the choroid has been ruptured, and usually close to the macula so that macular vision has been seriously interfered with or even destroyed.

S. *Errors of refraction.*—The figures given under the various sub-headings indicate the predominating error of refraction found in each patient. It is obvious that many cases have arisen in which a double diagnosis could be made, *e.g.*, myopia with astigmatism, or hypermetropia with astigmatism, etc., etc. In each case only one diagnosis has been entered, and that has been decided by personal choice as being that moiety which was causing the greatest discomfort to the patient, or which was the greater when measured in dioptres. Quite a few patients complained of dimness of vision merely with a view to having glasses prescribed—they thought that glasses gave them an educated appearance—and one man was quite upset and returned to the clinic to complain when he found his glasses failed to confer upon him not only the ability to see clearly but also the power to read and to understand English. Many others, when they find that they are disqualified from entering certain branches of the public service, *e.g.*, police and railway traffic, because of the necessity of wearing glasses to reach the standard of vision required, have been disillusioned and extremely disappointed that " European Magic " or " White man's juju " has not yet produced a cure for refractive errors which would allow them to enter the service without glasses. Such is their faith in the European, especially in one who commonly goes by the title " The Eye Specialist." To him nothing concerning the eye should be impossible.

As mentioned under " Choroiditis " many different pathological conditions have been found during the routine examination of cases attending for correction of refractive errors, and I saw many patients complaining only of diminution of vision to whom the primary cause of their failing sight was of no interest or importance. All they wished was to have their sight improved—by glasses if possible. Of these conditions choroiditis in its later stages, and macular degeneration have been outstandingly common. Both these occur frequently in adolescents and the macular degeneration presents itself in all stages from a fine delicate stippling up to pigmentary masses obliterating the macula. Further investigation of both these conditions is urgently required.

T. *Muscle imbalance.*—It is most remarkable that only one case of strabismus presented himself in the 3,205 cases who attended the Clinic, but it is also remarkable that the incidence of strabismus is very much lower among the general population than in Europe. It is very, very rare in children, and the few cases which have been met occurred in eyes which had suffered some catastrophe resulting in diminished vision of such an extent that the eye had become almost useless and it usually diverged.

U. *Routine examination.* Government servants.—The number given here represents only that very small number of people

referred specially by their various departments because of inability to perform their work, in whom no abnormal condition was found. Among the candidates for Government appointments no single case of colour blindness has been discovered, although quite a number are ignorant of the names of colours, but are able to pass the tests after having a week's instruction on the English names. The examination of each candidate consists of inspection of the eye for signs of present or previous diseases, estimation of the amount of distance and of near vision by reading test types with each eye separately and the ability to distinguish the simple primary colours; no ophthalmoscopic examination could be attempted in the time available.

Appendix I—Operative Work

This had had to be curtailed within the limits permitted by the very meagre equipment which was able to be collected. Reference has already been made to this difficulty in the introductory paragraph, so no further comments need be made. The following is a brief statement of the various operations undertaken :—

TABLE III.—*Eye Operations, 1943*

Foreign Bodies, Removal of	61
Plastic on lids, chiefly for entropion	12
Curettage of lids, for trachoma	5
Cysts and Styes of lids	20
Diathermy for trichiasis	15
Pterygium, relief of	33
Cauterisation of ulcer corneae	12
Tattoo of leucoma	13
Staphylomata, reinforcement of	3
Iridectomy	5
Cataract, needling or extraction	25
Evisceration	8
Enucleation	1
Posterior sclerotomy	4
Iridencleisis	12
Removal of Filaria	6
Muscle advancement	1

My thanks are due to the Director, Medical Services, Nigeria, for permission to publish this paper and to Sister Danaher who has given to the Eye Clinic so much voluntary help without which the work could not have gone on as it has done.

REFERENCES

FITZGERALD MOORE.—*Lancet*, Vol. I, p. 1225, 1937.
MANSON-BAHR.—Tropical Diseases, 11th edition, p. 786, 1941.
SYDENSTRICKER ET AL.—*Jl. Amer. Med. Assoc.*, Vol. CXIV, p. 2437, 1940.

A NEW INSTRUMENT FOR DARK ADAPTATION TESTS*

BY

W. KOCH

DEPARTMENT OF HYGIENE, THE HEBREW UNIVERSITY, JERUSALEM

SEVERAL instruments are known for testing dark adaptation, Nagel[1], Feldmann[2], Jeans, Blanchard and Zentmire[3] and Hecht and Shlaer[4], each described a type of apparatus for determining the light threshold in dark adaptation (minimum perceptible).

The most reliable of these instruments is that of Hecht and Shlaer. However, when Hunt and Palmer[5] tested simultaneously a series of people with three different instruments of the same type they did not obtain identical findings. Only after some modifications they succeeded in making these instruments give concordant results.

It is intended to describe below a simpler instrument which is relatively cheap and easy to construct and at the same time appears reasonably reliable.

Description of the Instrument

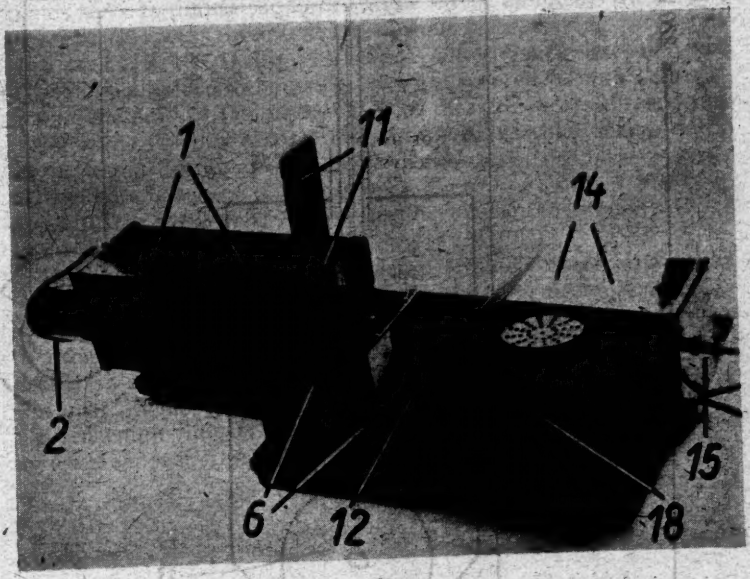
The instrument consists of an oblong box (1), one end of which (2) fits the eyes and nose, similar to a stereo-viewer, but without lenses. A piece of metal (3) may be shifted over one hole so that only one eye may be tested.

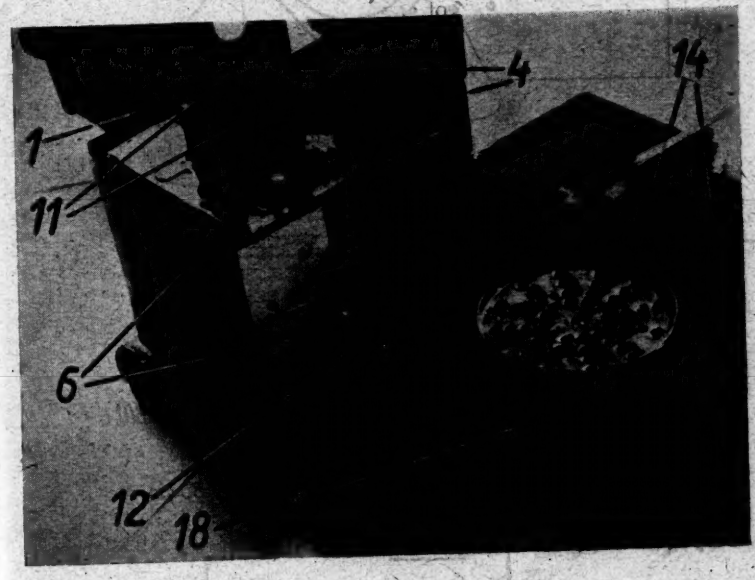
The box is about 35 cm. long and its end is covered by a clear glass plate (4). At the right and left ends of the plate, 5 cm. from the centre, is a number in Indian Ink (5 r) and (5 l) (in the drawing represented by filled half circles), which serves as a fixation point, for the right and the left eye respectively.

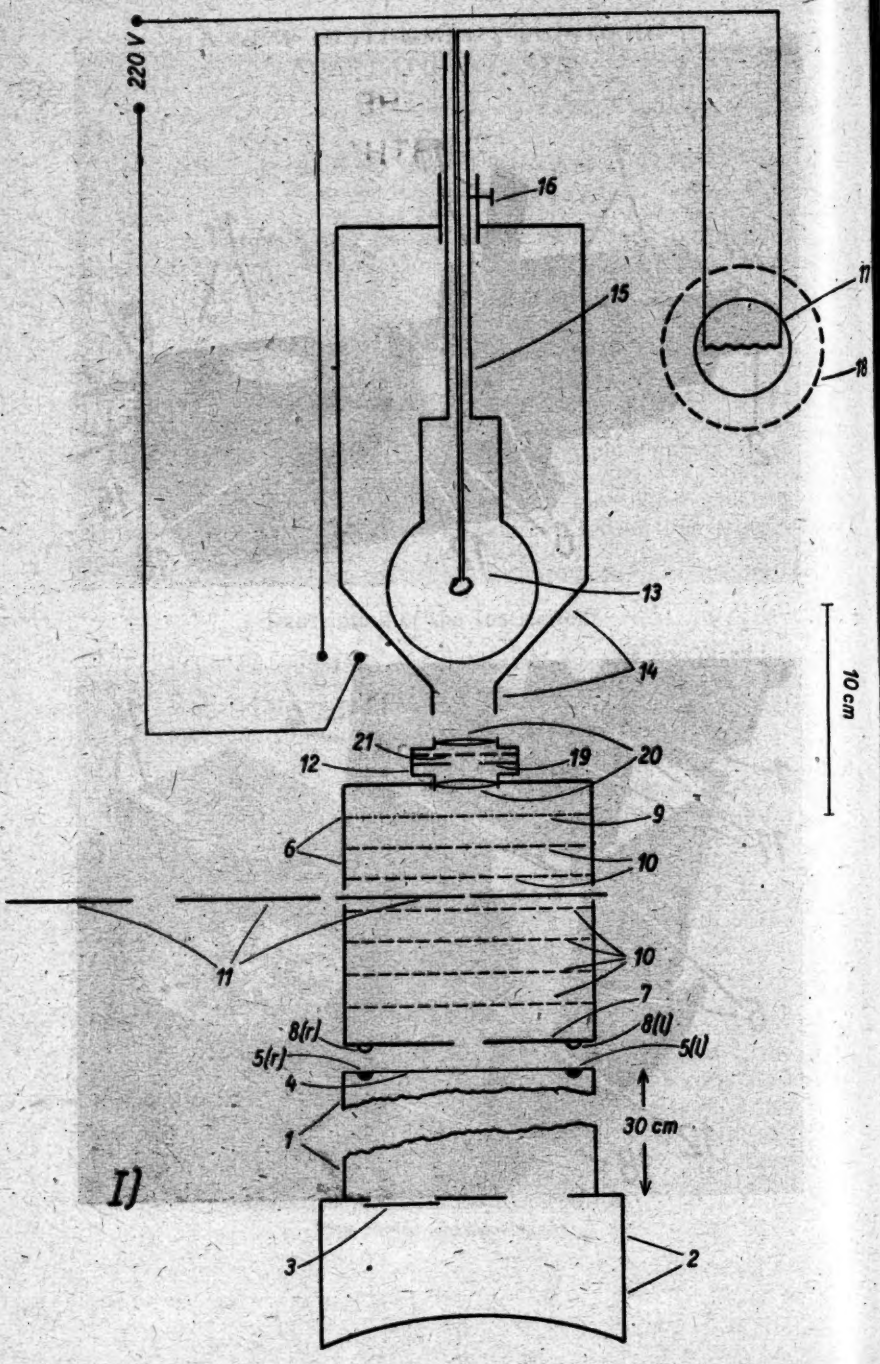
The next part of the instrument is a camera-like box (6) which is hinged (Photos) and can thus be removed from the path of the rays. The end of this box facing the glass plate (4) is closed with a black cardboard (7), with a central hole 14 mm. in diameter. To the right and left from the centre of the hole is a fluorescent figure (8 r, 8 l) (empty half circles), which adjoin the Indian Ink figures on the glass plate of the viewing box when that and the camera-like box are brought into line. (Drawings I and III.) These fluorescent figures serve as fixation points in the dark. Into the camera-like box plates are inserted. A blue glass plate (9), a series of ground glass and opalescent glass plates (10); these

* Received for publication, September 20, 1944.

* See photos and drawings.

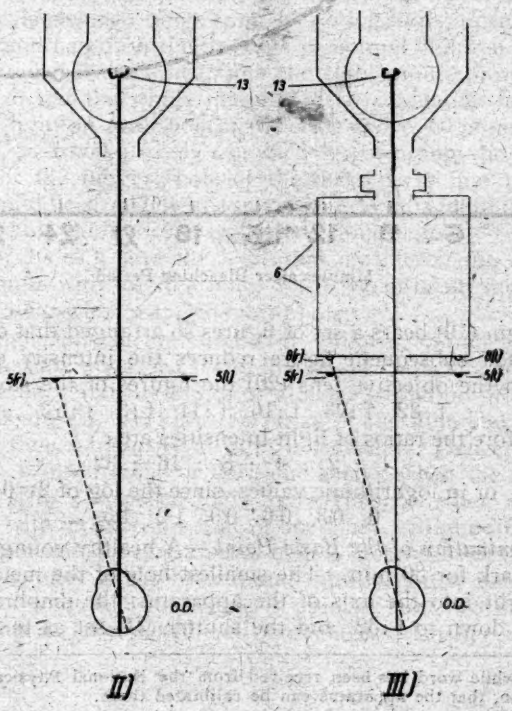

1
11
14
2
15
6
12
18


4
14
1
11
6
12
18


220 V
16
15
17
18
13
14
10 cm
21
12
19
20
9
6
10
11
10
7
8(r)
8(l)
5(r)
5(l)
4
1
30 cm
I)
3
2

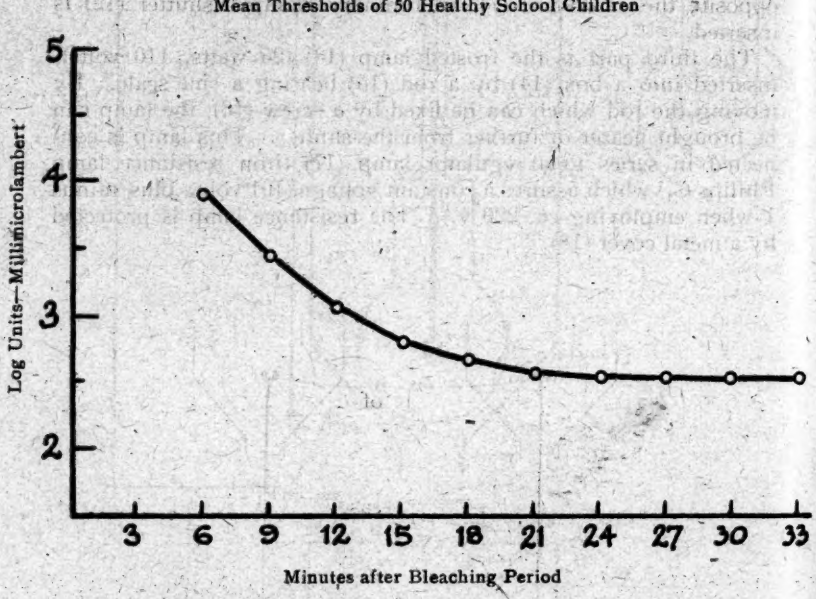
plates serve to diffuse the light and to reduce its intensity. A strip of metal (11) with three holes of various sizes, having a relationship of 1 : 10 : 100 is inserted like a lantern slide into the box. These holes reduce the intensity of light in predetermined proportionate amounts. The upper edge of the strip bears three dentations, while the box carries their counterpart; a flat spring and a tooth, similar to the arrangement which keeps the objective lenses in the nose piece of a microscope in position. Into the wall opposite the cardboard (7), an ordinary Compur shutter (12) is inserted.

The third part is the frosted lamp (13) (25 watts, 110 volts), inserted into a box (14) by a rod (15) bearing a cm. scale. By moving the rod which can be fixed by a screw (16), the lamp can be brought nearer or further from the shutter. This lamp is connected in series to a regulator lamp (17) (iron resistance lamp Philips C_1) which assures a constant voltage (101 volts, plus/minus 1 when employing ca. 220 v.). The resistance lamp is protected by a metal cover (18).



Calibration of the Instrument.—Since an optical check of the instrument is not easily available, the base of our scale is fixed by the mean light threshold of young healthy persons after sitting in the dark for 30 min.* According to Hunt and Palmer (l.c.) the mean of this threshold is 2·5 log units of millimicrolamberts.

A diaphragm is considered to be one of the most reliable means of reducing the intensity of light (Sewig[6]). An ordinary camera



diaphragm (19) bears a set of figures so arranged that on stopping down each subsequent figure reduces the intensity of light by half. In the objective lens (20) the figures of the stop are:

f:32 f:23 f:16 f:11 f:8 f:6·3

Therefore the ratios of light intensities are:

1 : 2 : 4 : 8 : 16 : 32

or in logarithmic values, since the log of 2=0·3

0 0·3 0·6 0·9 1·2 1·5

Determination of the Basic Point.—A healthy young person sits in the dark for 30 min. The smallest hole of the metal strip (11) is brought into the axis of the apparatus, the diaphragm (19) is stopped down to f:32, and the shutter (21) set as to deliver half

* Meanwhile word has been received from the National Physical Laboratory, Teddington, that the apparatus can be calibrated there.

a second. Then he is asked to look with his right eye at the fixation point (fluorescent figure 8 r). The shutter is then wound and released. Three possibilities exist:

(1) The person may be unable to see anything.
(2) The person may see a bright flash.
(3) The person may see a faint flash, just visible, without form.

In case (1), one or more ground glasses are removed from the box, until the response 3 is obtained. In case (2) ground glasses are added to the box till response 3 is achieved. The final adjustment can be performed by moving the rod (15) of the lamp. A reading of the position of the lamp rod (15) is now taken and the rod fixed in position; taking other persons the test is repeated.

This opening of the diaphragm (f:32) thus established gives us the normal 30 min. threshold value and is known to correspond to a light threshold of about 2·5 log units of millimicrolamberts (5). Since f:32 has been fixed to correspond to 2·5, the subsequent figure of the stop, f:23, corresponds to 2·8 (see last line of our chart), f:16 to 3·1; f:11 to 3·4; f:8 to 3·7; f:6·3 to 4·0. These figures are entered on a cardboard attached to the face of our shutter (see photos); this cardboard is the scale of our instrument. Since our scale covers a range from 4·0-2·5 log units it can be seen from the graph based on the findings in normal children that the dark adaptation can be tested from the 10th minute onwards.

In order to test the whole range of dark adaptation following exposure to light an extension of the scale above 4·0 is necessary. This extension can be easily obtained by bringing the middle-sized hole or the biggest hole of the metal strip into position. Taking the middle-sized hole the increase in light is tenfold, taking the biggest hole the increase in light is hundredfold. Since the logarithm of 10 is 1, and the logarithm of 100=2, the range is 2·5-4·0 log units with the first hole, 3·5-5·0 when using the second hole, and 4·5-6·0 when using the third hole.

The arrangement can be checked as follows: Small pieces of photographic film, about 3 x 3 cm. in size are cut. The apparatus is put in the dark and the pieces of film are pasted on to the hole in the cardboard (7). Within the range of the film, the product of exposure time x intensity of light is constant. Hence the film should show a black circle of the same shade, when the smallest hole of the strip is exposed for a given time, as when the next hole is used with an exposure time of one-tenth. Slight differences may arise from the fact that a small hole is more difficult to centre than a bigger one; it has been found, however, that there is no real difficulty when a 2 mm. hole is used, 2 mm., 6·3 mm. and 20 mm. being a rather useful set of diameters; smaller sizes are not feasible.

Sources of Error

(1) *Shutter.*—As a time-factor is involved in our test it is necessary to make sure that a good quality of shutter is used. A Compur shutter meets this requirement. Slight deviations in the time delivered have no serious effect on the results, since a flash which cannot be seen at an exposure time of half a second will not be seen at a longer exposure time either.

(2) *Varying Intensity of Light.*—(*a*) Fluctuations in Voltage: Small changes in voltage induce marked changes in the output and composition of light. This difficulty is overcome by inserting an iron resistance lamp. The effect of changes in current is further reduced by keeping the lamp on a somewhat lower voltage than stated on the bulb (in our apparatus 101 v. instead of 110 v.), as a variation of say 100 v. plus/minus 5 does not alter the light output to the same extent as 110 v. plus/minus 5.

(*b*) By using a seasoned bulb, kept on a lower voltage as mentioned above, no marked decrease with age should occur.

Performance of Test

(1) The apparatus is put up in a dark-room.

(2) For the bleaching period the camera-like box is tilted to the side and thus removed from the path of rays.

(3) If the right eye is to be tested, the metal shutter, contained in the eye-piece is shifted as to cover the left eye.

(4) The person looks with his right eye at the Indian Ink figure on the glass-plate (5 r) for three minutes; an area of the retina corresponding to the size of the opening of the lamp-box is thus bleached.

(5) The eyes are covered so as to prevent further effect of light.

(6) The fluorescent figure (8 r) is exposed to the light of an ordinary lamp or torch to intensify the fluorescence of the fixation point.

(7) The camera-like box is now tilted back into normal position, the 20 mm. hole of the metal strip centered, the diaphragm of the shutter completely opened (to number 4·0), and the shutter set to deliver half a second.

(8) The bandage over the eyes of the subject is now removed and the patient asked to fix his eye on the fluorescent figure (8 r). Now the shutter is wound and released. Between 3-5 minutes after bleaching the normal person should be able to see the light flash when looking at the fluorescent fixation point. If he does, the diaphragm is stopped down to meet the progressive increase in dark-adaptation.

(9) When a small diaphragm opening is reached the middle-sized hole is centered by shifting the metal-strip (11). Then the

diaphragm opening is increased ten times (or one log unit), and the test continued by reducing the diaphragm opening.

(10) Again, when a small opening of the diaphragm is reached which emits a visible flash, the smallest hole of the metal strip is centered and the process repeated.

(11) The number on the cardboard gives the direct readings of the threshold point when the smallest hole is used. When the largest hole of the strip is used, two should be added to each figure, and when the middle-sized hole is used, one should be added.

Practical Hints

(1) *Arranging the tests.*—The most stable reading among all thresholds is the final threshold. While according to Hunt and Palmer the variability in repeated tests on the same person is about 0·56 log units after ten minutes, the differences occurring after 30-33 minutes are only plus/minus 0·1 log units. Though a poor dark adaptation can be assumed when it takes a longer time to arrive at *e.g.*, 4·0 log units, compared with normal cases, there is, on the other hand, the possibility that complete bleaching of the purple was prevented by closing the eye. In the latter case a person with a poor dark adaptation will quickly be able to give low readings. After about thirty minutes, however, the findings are practically independent of the intensities of light employed in preadaptation, and this increases the value of the results.

(2) *Testing some people simultaneously.*—Since the final threshold reached after about 30-40 minutes is very reliable and highly specific, the following technique was employed with good results in a survey of children: Each child was bleached for three minutes, then the eyes covered with a bandage or a handkerchief and the next one taken for bleaching and so on. After thirty minutes or more the final threshold of the first child was determined. Children yielding high thresholds were submitted to repeated tests to exclude the possibility of lack of collaboration. If high readings were again found, a complete curve was plotted. (s.b.).

(3) *The answers.*—According to Hunt and Palmer (l.c.) there is a difference between "Image just perceptible, Form and colour absent" and "definitely perceptible" of about 0·2 log units; another 0·2 between "definitely perceptible" and "form present"; 0·2 more between this perception and that defined as "bright image with form." According to our experience the patient will yield slightly better readings when approaching the final threshold from the visible side. Therefore, to give the person

an orientation of what is going on, it will be found best to deliver a bright flash of say 5·0 log units; he will then know where to locate the flash. Then we shift our metal-strip to the smallest hole, close down the diaphragm and ask the person to be tested to respond to the faintest visible flash. Now the final threshold is approached from the underthreshold side. Eight to ten flashes of different intensity are delivered and the figure of least intensity taken as the final threshold. This figure should be confirmed by two or three changes from " yes " to " no."

(4) *Fatigue.*—It is of no use to ask the person too frequently, since the answers will become less clear. It is by far better to give him three minutes to rest with closed eyes in the dark, and then to ask once more.

(5) *Size of pupil.*—Provided the pupil is not rigid the result will not be appreciably affected. According to Reeves[8] the pupil reaches its full size after five minutes in the dark.

(6) *Plotting the complete curve.*—In the beginning of an adaptation test it will be seen that recovery proceeds very quickly. Therefore it is more convenient, not to determine the light threshold at intervals of three minutes as it is usually done but to release the shutter repeatedly and to mark the time when a given threshold (5·0, etc.) is reached. The dark adaptation curve itself is plotted with time as abscissa and log units of millimicrolamberts as ordinata.

Findings

The calibration of our apparatus is based on the assumption that the average final threshold of healthy children is 2·5 log units of millimicrolamberts (graph 1).

After the calibration, a group of 352 normal children, aged 6-14 years were tested and these also yielded a mean final threshold of 2·5, the standard deviation being 0·161. Data on standard deviations for children are not available, but our figure corresponds reasonably well with those of adults reported by Hunt and Hayden[10]. These authors found among subjects of less than 40 years a standard deviation of 0·250 (Mean : 2·698), and among subjects 40 years and older a standard deviation of 0·328 (Mean : 3·010). Michaelson[11] working with our apparatus gives in a recent paper a mean of 3·0 and a standard deviation of 0·33 as normal for adults.

Taking the mean plus twice the standard deviation as the probable limit of normality, a final threshold over 2·82 in our apparatus may be considered as suspicious, while a threshold over 2·98 (mean plus three times standard deviation) is definitely abnormal for children. For normal limits in adults see Michaelson[11].

Acknowledgment.—I wish to thank Prof. I. J. Kligler, Department of Hygiene, Hebrew University, under whose supervision the work has been carried out, for his constant help and advice; sincerest thanks are also due to Prof. S. Hecht, Columbia University, for his helpful criticism.

REFERENCES

1. NAGEL, W. A.—Zwei Apparate für die Augenärztliche Funktionsprüfung. *Zeitschr. f. Augenheilk.*, Vol. XVII, 1907.
2. FELDMANN, J. B.—Practice of dark adaptation. *Arch. Ophthal.*, Vol. XIX, 1938.
3. JEANS, P. C., BLANCHARD, E. and ZENTMIRE, Z.—Dark adaptation and vitamin A. *Jl. Amer. Med. Assoc.*, Vol. CVIII, p. 451, 1937.
4. HECHT, S. and SHLAER, S.—An adaptometer for measuring human dark adaptation. *Jl. Optical Soc.*, Vol. XXVIII, 1938.
5. HUNT, E. P. and Palmer, C. E.—Medical evaluation of nutritional status *Milbank Memorial Fund Quarterly*, Vol. XVIII, No. 4, 1940.
6. SEWIG, R.—Objektive Photometrie. Julius Springer, Berlin, 1935.
7. GRAHAM, C. H. and MARGARIA, R.—Area and the intensity-time relation in the peripheral retina. *Amer. Jl. Physiol.*, Vol. CXIII, 1935.
8. REEVES, P.—Rate of pupillary dilatation and contraction. *Psychol. Rev.*, Vol. XXV, No. 4, 1918.
9. PALMER, C. E.—Dark adaptation characteristics of private school children measured with the adaptometer. *Amer. Jl. Public Health*, Vol. XXXI, 1941.
10. HUNT, E. P. and HAYDEN, K. M.—Medical evaluation of nutritional status. *Milbank Memorial Fund Quarterly*, Vol. XX, No. 2, 1942.
11. MICHAELSON, I. C.—Defective night vision among soldiers: dark adaptation results and their use in diagnosis. *Brit. Jl. Ophthal.*, Vol. XXVIII. No. 3, 1944.

EXPLANATION OF FIGURES

Drawing I gives the details of the apparatus. Drawing II, corresponding to the photos shows the bleaching of the retina, Drawing III, like Drawing I, the determination of the threshold.

1. Oblong viewing box.
2. Attachment to fit the eyes and nose.
3. Metal piece to cover one eye.
4. Clear glass plate at the end of 1.
5. (r) and 5 (l) Indian ink figures. (Fixation points).
6. Camera-like box.
7. Black cardboard, closing 6.
8. (r) and 8 (l) Fluorescent figures. (Fixation points).
9. Blue glass plate.
10. Ground glass and opalescent glass plates.
11. Metal strip.
12. Compur shutter.
13. Frosted lamp.
14. Lamp housing.
15. Rod carrying the lamp.
16. Screw fixing the rod.
17. Regulator lamp.
18. Cover of the regulator lamp.
19. Diaphragm of the Compur shutter.
20. Lens inserted into the shutter.
21. Segments of the shutter.

TRACHOMA IN WEST AFRICAN NEGROES*

BY

Major J. GRAHAM SCOTT, R.A.M.C.

GLASGOW

ALTHOUGH no race is immune from trachoma (MacCallan, 1936) it is thought to be rare among negroes (Duke-Elder, 1943).

Only in recent years has the prevalence of the disease among West African negroes been recognised.

The purpose of this paper is to assess the rate of infection among negroes in British West Africa and to describe the disease as it affects the native.

Previous reports

The earliest suspicion of trachoma in West Africa is aroused by the report of an outbreak of "ophthalmia" on the slave ships Le Rodeur and El Leon, Guillie (1820). Mackenzie (1845) quotes this as an example of contagious or Egyptian ophthalmia (distinct from gonorrhoeal ophthalmia, though either type might be complicated by granular conjunctiva or trachoma).

Such an outbreak was not uncommon on slavers (Harold Scott, 1938) and since it not infrequently resulted in blindness, it was looked upon with dread by the crew.

Pergens (1898), Talbot (1927), and Deplanche (1931), found very little trachoma among negroes in West Africa, although Talbot found it endemic in North Cameroon, chiefly affecting Arabs *e.g.*, 8 per cent. in a Musulman school at Tibati.

Reviewing the position in French Colonies Motais (1926) stated that little or no trachoma had been found below 11° N. but that it was prevalent above this latitude.

He quoted cases at Dakar, 33 per cent. in schools at Mopti, and 10 per cent. among conscripts from Lake Chad.

Marque (1939) considered that the disease had spread when, in 1936, he found reports of many cases below 11° N. (*i.e.*, in all French Colonies along the coast from south of Dakar to the Cameroons).

In a survey of British colonies MacCallan (1936) stated that no case had been noted in the Gambia or in the Gold Coast and that much conjunctivitis had been reported in Sierra Leone. In the latter colony Robertson, (1938) found that 70 of 109 cases of conjunctivitis had trachoma.

In Nigeria 136 to 217 cases of trachoma were reported in the annual medical reports from 1935 to 1939. Dodds (1942) at Lagos found that 66 of 198 cases of conjunctivitis had trachoma.

* Received for publication, September 8, 1944.

Work on the incidence of trachoma in Gambian schools by Carmichael Wilson was interrupted by war but agreed with the 5 per cent. figure given in this paper (personal communication).

Author's cases

Trachoma in West African negroes is a mild disease, despite the fact that such debilitating diseases as malaria, yaws, and ankylostomiasis are prevalent.

Following the work of MacCallan, (1908-39) and of Wilson, (1927-38), pannus was taken as the keystone of diagnosis. When sub-epithelial infiltration or scarring were also present, trachoma was diagnosed. When changes other than pannus were not recognisable, the case was labelled " doubtful trachoma."

As will be shown, these are cases of healed trachoma and resemble the " sub-clinical " cases described by McKelvie (1941) in natives of the Sudan.

Cases of spring catarrh and of follicular conjunctivitis are confusing, as fingers of the normal limbal ring of pigment are apt to be confused with neo-vascularisation. With experience no difficulty was found in differentiating the two.

DISTRIBUTION

		Trachoma	Doubtful trachoma	Total per cent.
GAMBIA				
1,114 School children. (Bathurst)		46	27	6·5
80 School children. (Georgetown)		15	6	26·2
500 Soldiers		41	18	11·8
284 Civilians:	50 Bondalli	20		
	42 Sintet	14		
	33 Jawara	10		
	50 Kanuma	12		
	33 Basse	3		
	26 Kanfinda ...	5		
	50 Lamin	7		
	284	71		25·0
GOLD COAST				
375 Soldiers		37	15	13·9
NIGERIA				
500 Soldiers		41	18	11·8
CAMEROONS				
300 Soldiers		5	2	2·7

In round figures one may say that 5 per cent. school children, 10 per cent. soldiers, and 25 per cent. in some villages are infected in the Gambia. (The first three villages in the list were picked

out during a survey by Captain D. McGowan, R.A.M.C., as presenting more blind people than usual.)

One may say that 10 per cent. of Gold Coast and of Nigerian soldiers, and 2 per cent. of Cameroon soldiers are infected. These cases differed in no way from those studied in Gambians.

Two soldiers from a regiment of American negroes stationed in Liberia developed a similar trachoma after three months in that colony.

Naked eye examination of 300 men from the regiment revealed no further cases and the medical officer had seen no similar cases.

Differential diagnosis

It has been noted that one-third of the cases were diagnosed as "doubtful trachoma." In such cases, pannus or the vessels resulting from a cleared pannus were the chief or only signs of trachoma.

In many cases, examination with the slit-lamp microscope established the presence of fine scarring of the palpebral conjunctiva, but in other cases no change from normal was seen.

The possible factors considered were: 1, congenital syphilis; 2, syphilitic keratitis; 3, ariboflavinosis; 4, tropical diseases; 5, normal variation.

Factors 1 and 2 are difficult to exclude in a yaws infested country where the Kahn test is positive in roughly 30 per cent. of the population.

The following facts render improbable the diagnosis of syphilis:—

(*a*) No case presented signs of congenital syphilis. (*b*) The Kahn test was negative in 27 of 42 cases of doubtful trachoma (compared with a negative Kahn in 16 of 42 non-trachoma eye cases). (*c*) In 26 non-trachoma cases with a positive Kahn no corneal vascularity was seen. (*d*) A full course of injections of N.A.B. given to 10 cases of doubtful trachoma with positive Kahn resulted in slight improvement in one case only (such improvement was reported in mixed infection by Cornet, 1937).

It is concluded that neither syphilis nor yaws is more than a mild contributing factor in a small proportion of cases.

Factor 3.—To exclude ariboflavinosis, 6 cases with perleche and cheilosis as well as corneal vascularity were subjected to a therapeutic trial with 9 mgs. riboflavin daily for 21 days. Perleche and cheilosis were cured in all, but in no case was the vascularity improved.

Furthermore the vessels were only found in the upper and lower arcs of the cornea and were not evenly distributed around the limbus.

Thirty-six of 280 boys and 15 of 280 girls had angular stomatitis

but corneal vascularity was not more among these cases than among the others.

Only a few girls and one boy had phrynoderma. There were no Bitot's spots or other signs of vitamin A deficiency in the Bathurst school children.

It is concluded that vitamin deficiency is not a factor.

4. In 150 cases of trypanosomiasis and in 300 cases of onchocerciasis corneal vascularity due to the disease was an exceedingly rare complication, although both diseases had the expected proportion of cases with trachomatous pannus. None of the children presented signs of either disease and it is concluded that such tropical diseases are not a factor.

5. (Wilson, 1932) described normal limbal vessels and noted cases of " advanced limbus." (Stannus, 1944) found it quite impossible, owing to the great variability, to formulate any satisfactory method of notation for describing the degree of vascularity of the limbus and cornea.

(Cuenod and Nataf, 1934) noted an extension of the limbic plexus, particularly among young negroes, which they attribute to the remains of foetal vessels.

Such possibilities cannot be discounted, but having seen Tr. 1 clear up leaving only a fringe of vessels extending beyond the ring of pigment, it is my opinion that the great bulk of these cases of " doubtful trachoma " represent Tr. 4 or stage 4 of a mild infection which has healed without complications.

Description of cases

Based on the examination of 300 cases of trachoma, some seen during the survey, others seen as out-patients or as in-patients at a military hospital, and on the re-examination after six months of 57 infected children and of 61 soldiers, the following description of trachoma in West Africa is compiled.

The children and villagers were examined with binocular loupe and the soldiers by slit-lamp. The four stages described by (MacCallan, 1936) served in classifying.

In brief. Tr. 1 is the general lymphocytic type. More than half the cases pass to Tr. 3 without complications.

Tr. 2*a* is exceptional.

Tr. 2*b* is difficult to distinguish from Tr. 1 as papillary hypertrophy is often slight.

Tr. 3 is recognised by scarring, but re-infection probably occurs not infrequently.

Tr. 4 requires no comment.

In detail. Tr. 1.—The onset is insidious. One rarely elicits any complaint or previous history on questioning. The disease is

well established in 5 year old children and the onset in early childhood is assumed. Girls are more commonly affected than boys. Thirty-four of 400 girls and 39 of 714 boys (including doubtful cases) were affected. Tr. 1 is of the general lymphocytic type, giving a red or purple thickened velvety upper palpebral conjunctiva.

Follicles are rarely visible by naked eye but in some cases can be found with magnification.

Pannus is visible on magnification, associated with varying degrees of corneal haze seldom affecting vision.

Tr. 1 was observed to clear completely in 2 cases.

Some cases become secondarily infected and pass to stage 2.

Many cases evolve directly to stage 3, some with the mildest permanent lesions and others prone to relapse or re-infection (with trachoma).

Tr. 2*a*.—This stage is a rarity. Only 2 cases were seen with bleb-like excrescences. Both were children.

Tr. 2*b*.—In the absence of an obvious conjunctivitis, stage 2*b* is difficult to differentiate from Tr. 1 (general lymphocytic type) as the papillary hypertrophy is seldom well marked.

Many soldiers were seen on routine examination with no secondary infection and no history of recent conjunctivitis, yet presenting velvet, red, or purple, palpebral conjunctiva and pannus.

Slit-lamp examination showed varying degrees of papillary hypertrophy and sometimes a trace of scar tissue.

Whether this represented a re-infection (Tr. 1) of an old case or a true Tr. 2*b*, or whether Tr. 1 can persist for many years, cannot be determined without further study.

Raspberry-like processes were seldom seen by naked eye, not even in cases which had a secondary conjunctivitis, though papillary hypertrophy was visible with magnification in these cases.

Secondary infection is uncommon. It was found in less than 1 per cent. of all cases diagnosed as trachoma on routine inspection. Only 8 of 22 hospital cases had a purulent conjunctivitis though the remainder had a watery discharge.

Cornea in Tr. 1 and 2*b*.—Pannus is superficial to Bowman's membrane and is tenuous in type. It is seldom visible to the naked eye. Active pannus is often preceded by an area of infiltration.

In a few cases follicles resulting in Herbert's pits (Herbert, 1904) are seen at the limbus. The cornea may become abraded and oedematous but intractable ulcers seldom develop. These abrasions stain with fluorescein, but deeper infiltrates also develop, leaving nebulae resembling the nebulae of onchocerciasis.

Facets seldom form but the nebulae interfere with vision to a greater or less degree.

The majority of such cases quieten after some weeks, though attacks tend to recur and to damage vision if untreated. It was estimated that about 5 per cent. of all military cases of trachoma required hospital treatment during one year.

Tr. 3.—When the active stage is over (and this occurs in the vast majority of cases without treatment) the pannus regresses. The number of affected adults who present superficial vessels extending well into the upper and sometimes lower half of an otherwise clear cornea is surprising. But for the absence of an associated iritis or choroiditis one might well think of congenital syphilis. However, the continuity of the corneal vessels with the conjunctival vessels rules this out.

In milder cases, the pannus does not advance much beyond the limbus, and when such cases quieten the only sign remaining is a superficial vascularity confined to the upper arc of the cornea. Even this tends to fade and some such cases diagnosed as doubtful trachoma present a faint striate keratitis on re-examination in which the vessels are not visible.

The palpebral conjunctiva of some cases in stage 3 presented areas of purple thickening cut off by lines of scarring, giving a marbled appearance.

This " marbling " was also seen after the hyperaemia in some hospital cases had quietened and led to the conclusion that relapse from Tr. 3 to Tr. 1 was not uncommon in cases uncomplicated by bacterial infection.

Palpebral scarring in children is often difficult to detect, but it is nearly always present in adults.

Scar tissue is minimal in some cases and, though easily recognisable by naked eye in others, seldom leads to gross deformity of the lid.

Arlt's cicatricial line (Arlt, 1881) is seen and such cases may present some buckling of the lid, but trichiasis is uncommon.

Of 100 cases, 8 had trichiasis, 12 had ptosis, and 3 had a sinuous lid border as described by Herbert (1907).

One native with trichiasis had practised self-epilation for many years.

Trichiasis with badly scarred cornea is seen in some village women, less often in men.

Among soldiers with trachoma, though many had some diminution of vision, only 1 in 100 was unfit for service on account of corneal opacities or facets.

Tr. 4.—Stage 4, when no further inflammatory activity is evident, is usually free from serious complications.

Influence of climate

In the Gambia there are three well marked seasons.

1. From July to October there is heavy rainfall when insects are plentiful.
2. The rest of the year is dry.
3. In January or February there is a period of hot, dry, dusty wind.

No seasonal incidence of trachoma occurred.

Exceptional cases

(*a*) Healing without scar. (*b*) Uni-lateral case. (*a*) Two children were seen 8 months and again 12 months after Tr. 1 had been diagnosed. In both cases healing had occurred with no evidence of damage. The identity of the children was established and there is no doubt that in the two cases the sub-epithelial infiltration and pannus had regressed leaving no sign. Other children who present only vessels in a healthy cornea support the view that healing without scarring can occur.

(*b*) With one exception, all the cases examined were bilateral. The exception was a Gold Coast sergeant. He had been to school and was quite certain that he had no eye trouble previous to his service in East Africa in 1940. There his left eye became inflamed and he received treatment for 14 days from the unit medical officer. He had a second attack in 1941 which subsided without treatment in 10 days. He had a third attack in 1942 when he was sent to me after 10 days treatment at his unit.

The left upper lid was ptosed and the palpebral conjunctiva was thickened, red and velvety. Pannus of the upper third of the cornea could be seen by naked eye. Slit-lamp examination showed "a white mass on the cornea raised like snow in front of a vascular plough." There was no general conjunctivitis and he only complained of slight pain. There was no serous or purulent discharge, but examination led to profuse lacrimation.

The whole cornea became opaque in one month although the palpebral conjunctiva settled to "slight congestion with no follicles."

Pannus began to fade but the corneal opacity persisted and vision was reduced to 6/60. At no time during his two months in hospital was there any abnormality of the right palpebral conjunctiva or cornea and no evidence of past or present pannus could be seen with the slit-lamp.

Pathological investigations

Conjunctival scrapings were examined in a series of 30 cases of Tr. 2 and Tr. 1. Inclusion bodies were seen in 13 cases. In

a control series of 20 healthy eyes similar bodies were found in 3 cases. Further work requires to be done on this point and on the early epithelial changes described by Taborisky (1930-32).

Treatment

Cases discovered on routine examination were not treated but were kept under observation. Most cases were unchanged on re-examination; some had improved; very few were worse. In some children and in a few adults only careful examination revealed pannus six months later.

Cases in Stage 3 were treated at first with copper sulphate. They compared so badly with untreated cases that this treatment was stopped.

Atropine 1 per cent. and protargol 10 per cent. drops were used for hospital patients and the average case cleared up in 10 or 14 days.

They were detained for a further week as it was found that a relapse occurred if cases went out too soon. This treatment was found satisfactory. Full doses of sulphapyridine by mouth did not hasten improvement.

Two cases were quite intractable and after 100 days in hospital had to be boarded out of the army.

As complications are so mild and as the disease tends to settle down on its own, it seems advisable to direct treatment first to preventing the spread of the disease by improving social and hygienic conditions and secondly to treating secondary infections if and when they occur.

Summary

1. Trachoma of the West Coast African negro is a mild disease.

2. It is of the general infiltrative type.

3. It affects 5 per cent. school children, 10 per cent. soldiers and 25 per cent. of some villages in the Gambia.

4. The same disease is found in 10 per cent. Gold Coast, in 10 per cent. Nigerian and in 2 per cent. Cameroon soldiers.

5. Three hundred American negro soldiers had no similar infection, but were not immune.

My thanks are due to Dr. L. H. Thomas for permission to examine the school children, to Col. Bourdillon, A.D.M.S., and to Col. Gordon, C.O. Hospital, for permission to do the survey, and to Mason Barker, Major, R.A.M.C., for his help in pathological investigations.

REFERENCES

ARLT (1881).—*Klin. Darstellung d. Krankheiten d. Auges. Wein.*
CORNET, E. (1937).—*Bull. Soc. Path. Exot.*, Vol. XXX, pp. 5, 403.
CUENOD, A, and NATAF R. (1934).—Biomicroscopie de la conjonctive. Masson et Cie, Paris.
DEPLANCHE (1931).—*Bull. Soc. Path. Exot.*, Vol. XXIV, pp. 5, 406.
DODDS, G. E. (1942).—*Brit. Jl. of Ophthal.*, Vol. XXVI, p. 257.
DUKE-ELDER, SIR W. S. (1943).—Text-book of Ophthalmology. Vol. II, p. 1596.
GUILLIE (1820).—*Bibliotheque Ophtal.*, Vol. I, p. 74, quoted by MacKenzie.
HALBERSTAEDER and PROWAZEK (1907).—*Deutsch. med. Wochenschr.*, Vol. XXXIII, p. 1285.
HERBERT (1904).—*Trans. Ophthal. Soc. U.K.*, Vol. XXIV, p. 67.
——— (1907).—*Trans. Ophthal. Soc. U.K.*, Vol. XXVII, p. 38.
MCCALLAN, A. F. (1908).—*Ophthalmoscope*, Vol. VI, pp. 857, 947.
——— (1910).—*Ophthal. Rec.*, Vol. XVII, p. 536.
——— (1913).—Trachoma and its complications in Egypt. Cantab.
——— (1931).—*Brit. Jl. Ophthal.*, Vol. XV, pp. 7, 371.
——— (1931).—*Rev. Internat. du Trach.*, Vol. VIII, pp. 2, 53.
——— (1934).—*Rev. Internat. du Trach.*, Vol. XI, p. 3.
——— (1936).—*Lancet*, January, p. 251.
——— (1936).—Trachoma. Butterworth & Co., London.
——— (1938).—*Brit. Jl. Ophthal.*, Vol. XXII, pp. 9, 513.
——— (1939).—*Rev. Internat. du Trach.*, Vol. XVI, 197.
MCKELVIE, A. R., KIRK, R. and HOLDER, H. J. (1941).—*Amer. Jl. Ophthal.*, Vol. XXIV, pp. 9, 1038.
MCKENZIE (1854).—Diseases of the Eye. Fourth edition. London. Pp. 457 and 643.
MARQUE (1938).—Les grandees endemies tropicales, Vol. X, p. 98.
MOTAIS, F. (1926).—*Rev. Internat. du Trach.*, Vol. III, p. 37.
PERGÉNS (1938).—*Ann. d'Ocul.*, Vol. CXX, p. 42.
ROBERTSON, W. J. (1938).—Annual Medical Report, Sierra Leone.
SCOTT, Sir H. H. (1942).—History of Tropical Medicine. Vol. II, p. 998.
STANNUS, H. (1944).—*Brit. Med. Jl.*
TABORISKY, J. (1930).—*Arch. f. Ophthal.*, Vol. CXX, pp. 139, 455.
——— (1932).—*Folia Ophthal. Orienta.*, Vol. I, p. 34.
TALBOT (1927).—*Rev Internat. du Trach.*, Vol. IV, pp. 5, 51.
WILSON, R. P. (1927-1938).—Reports—Giza Memorial Ophthalmic Laboratory, Cairo.
——— (1929).—*Rev. Internat. du Trach.*, Vol. VI, p. 76.
——— (1931).—*Brit. Jl. Ophthal.*, Vol. XV, pp. 8, 433.
——— (1932).—*Amer. Jl. of Ophthal.*, Vol. XV, p. 397.
——— (1932).—*Acta Ophthal. Orienta.*, Vol. I, p. 52.
——— (1940).—*Acta Ophthal. Orienta.*, Vol. II, p. 1.

"THE ANTIQUITY OF OPHTHALMOLOGY"*

BY

W. B. INGLIS POLLOCK

GLASGOW

PRIOR to the Greek period Egyptian medicine was regarded very highly; and was considered as the commencement of practical and clinical medicine. In fact one of the Greek writers commends specially the wisdom of the Egyptians, and the Odyssey contained the statement that the physicians of Egypt were skilled beyond

* Opening paper read at the Summer Series in the Department of Ophthalmology, University of Glasgow, April 5, 1944.

all others. These views were held, off and on, during succeeding ages until, in 1849 when Sir Henry Layard (1817-1894) discovered the great library of 30,000 clay tablets gathered by King Ashurbanipal of Assyria (668-626 B.C.) during excavation of the mound Kouyunyjik opposite Mosul, the site of Nineveh.

They were all in the Sumerian language, and of these the medical tablets numbered 800, while others contained the laws and regulations suggesting the famous code of King Hammurabi of Babylon, who reigned 1791-1749 B.C., which was discovered at Dusa by De Morgan (1839-1917) in 1901 A.D.

The stir and commotion caused by their discovery and translation lead the historians to place the reign of Hammurabi as far back as possible and to advance the early Egyptian dynasties later in order to obtain the time of the centuries necessary for such a development of civilisation, as is shown in the code.

It may be mentioned that the turmoil was not caused by the medical discoveries; but by the question whether the tablets did or did not confirm in certain respects the early books of the Bible.

But since then an enormous amount of work has been undertaken in the different fields of geology, archaeology, anthropology, palaeography, and philology; and the discoveries of the different medical papyri of Egypt and their translations have aided in altering the balance; and together have put the earliest known medical lore of the world in the country of the Pharaohs.

If we take these in turn it is only requisite to give a brief synopsis of the recent work on geology, and archaeology as it affects Europe, Egypt and Mesopotamia.

Into the pre-glacial period it is not necessary to enter, except to say that the Nile gulf of the Pliocene period is thought to have been due to a crack in the chalk strata or layer over Egypt, deposited by the sea once covering it, like the chalk cliffs of S.E. England. The Nile gulf was followed by a series of long lakes, which later became the Nile stream fed by the tropical rain belt farther south, nearer the Equator, and by the mountains of Abyssinia.

In the Ice age there were four extensive glaciations of Europe of which the second "the Mindel," was the most severe. It covered Europe almost to the Mediterranean, Great Britain to within a short distance of the south coast, Mesopotamia and much of Asia around the various mountains; but Egypt was left clear as well as a strip along the north shore of the Mediterranean. In this second glaciation the Nile rose 90 to 100 ft. above modern flood level, and new gravels were deposited along the edges of the new banks.

In the third glaciation the Nile rose only 30 ft., while in the fourth, the "Wurm," glaciation it fell 60 ft. below modern flood

level. At the rate of deposit of alluvium of 4·08 inches of a rise in a century, since measurements were made in the 13th century B.C. this would give 15,000 to 18,000 years for the glaciations. At one time it was thought that the north pole had moved to the Equator four times and back again, but that theory has been abandoned.

For each of these glaciations the discovery of eoliths, and rough pottery and evidence of hunting animals has shown that on each of the beaches of the variation in the Nile height, there has been man there and that he has adjusted himself to the circumstances, and thus it has been definitely proved that man has been present in the Nile valley since the beginning of the Pleistocene period, *i.e.*, since the onset of the Post Tertiary. The Cambridge Ancient History, Vol. I, p. III, as if grudgingly, says it is only recently realised that in the Nile valley we have a small continuous series of deposits outside the glaciated area.

On the other hand Mesopotamia has been completely covered twice or thrice during the glaciation periods with ice; and on its recession the Euphrates had to make a new channel each time through the gravel and rocks left by the glaciers.

The ancient language of the Egyptians was known up to the time of the Greek Ptolemies, but had fallen gradually out of use with the introduction of Greek, followed by Latin, and finally by Arabic the language of the Mohammedan conqueror. The Hieroglyphs on all the monuments and temples, remained a closed book therefore until last century, when M. Boussard, one of Napoleon's officers at the time of his conquest of Egypt, found the large stone of basalt at Rosetta, bearing three inscriptions, the Hieroglyphs above, with the Demotic, a written cursive form of the Hieroglyphs in the centre, and Greek below. The stone was brought to London, and tracing facsimiles of the inscriptions were sent to all scholars. Thomas Young of the undulatory theory of light, and colour vision, found a good many; but a Frenchman, Champollion (1790 to 1832), deciphered both completely. He had seen that modern Coptic (Egyptian Christians) was a descendant of the ancient language.

The Medical Papyri

The medical papyri have been divided into two groups, those with less, and those with much magic, but it is unnecessary to touch upon the latter. (1) Of the former, Ebers' Papyrus is the largest, and may be looked upon, and has been claimed, as the oldest book in existence, any earlier papyri being so short as not to be classed as books.

It is then a roll of 68 feet in length, and twelve inches broad. It is in almost perfect condition, and contains 110 pages of about

20 lines in each, giving 2,289 lines divided into 877 sections with the text in black, and the headings of the chapters, the names of the diseases, the directions for treatment, and often the weights and doses, all written in bright red, these being the rubrics, from which they get that name. It is preserved in the University of Leipzig, and exact copies in two volumes with all the plates printed in colour, were sent to every University by Ebers in 1876. The eye portion occupies a little over 9 pages, from Plate 55, 20 to Plate 64, 13, but we will return to it later. In 1889 Ebers published a book with the measures and doses and a translation of the eye section.

The Papyrus was offered to Georg Ebers (1837-1898) in 1872 by a native, who said that it had been found between the legs of a mummy in 1866, but the man who discovered it was dead by this time. Ebers had to get another German to pay the price as it was too much for him. He thought it was one of the lost sacred or Hermetic books of the priests of the God Thoth, the special deity of medicine.

The Papyrus contains portions on the alimentary system, minor medicine, disease of women, skin, eye, ear, nose and throat, nervous system, worms, including the hook-worm, arm and heart and hair. There are a number of cases for diagnosis at the end, including surgical treatment, the knife for some, and the cautery for haemorrhage. On the back of the papyrus was a most important calendar of Egyptian chronology. Ebers stated that the papyrus had been written between 1553 and 1550 B.C. and this has been confirmed; and that it was transcribed during the reign of Amen-Hotep I of the Eighteenth Dynasty, who lived two hundred years before Tut-Ankh-Amen. It is written in several different archaic dialects, and collected from forty different sources, and for these and other reasons it is believed that this papyrus has been copied from far older works. Breasted suggested that Edwin Smith's papyrus had come from the same place as the Ebers had been found and that the black script in it came from the Old Kingdom 3188-2248 B.C. and the rubrics from the Middle Kingdom 1990-1777 B.C. and the magical comments from the priests of the New Kingdom 1573-1314 B.C. and the same might be said of the Ebers.

The script is Hieratic, a cursive form of the Hieroglyphs, which are too complicated for writing and were only suited for chiselling on stone. Later on the general public used the Demotic, which was simpler still. In both cases the Egyptologists seemed to have transcribed the Hieratic and the Demotic back into Hieroglyphs for translation. These two run from right to left while the hieroglyphs go either way but are placed from left to right like modern European printing. See pages 26 and 27, Dr. Finlayson.*

*Ancient Egyptian Medicine. A bibliographical demonstration by Jas. Finlayson, M.D. *Brit. Med. Jl.*, Vol. I, pp. 748, 1014, 1061, 1893.

(2) Hearst Papyrus was discovered in 1899 and is now in the University of California, and contains about half of the Ebers, and has been assigned to the time of Tuthmosis III, XVIIIth Dynasty, but later than the Ebers.

(3) The Edwin Smith Papyrus was found at Thebes in 1862. It is now held by the Historical Society of New York. It is a roll 15 feet long, 22 columns or pages of 48 sections, nearly 500 lines. It is devoted to surgery with civil and war injuries, and fractures, commencing with the head and reaching to the chest. There is given examination, semeiology, diagnosis, prognosis, treatment and glosses on the archaic terms for all cases. Garrison states that the sword gashes and the fatal comminuted sword fractures correspond with actual findings in Nubian Mummies by Elliot Smith. The frontal sinus is described as the region between the eyebrows. The late Professor Breasted (1865-1935) published in 1930 the XXII plates in full with a transliteration of each into Hieroglyphs on the opposite side; with a text translation and commentary in English, in a separate volume.

The papyrus is a copy made in the XVIth century B.C., he held, when the surgical treatise was a thousand years old or more, from which this had been transcribed. This was shown by the commentary on archaic terms in the original treatise, incorporated in it centuries after the meaning had become obscure, and the commentary is written in red in the copy. The glosses are in the language of the Middle Kingdom, thus placing the black type to the time of the Old Kingdom. This gloss has given now for the first time the meaning of many of the archaic words to Egyptologists of to-day. Breasted (p. 10, original treatise) said the black has "Moor him (the patient) at his mooring stakes." The commentator knows this curious idiom to be unintelligible and appends the explanation in red "It means 'Put him on his accustomed diet and do not administer to him any medicine'."

In a total of 69 such brief discussions there is thus formed an early Egyptian dictionary of archaic medical terms.

The original author had to describe brain injuries, so he likens the convolutions to the corrugations on metallic slag; a segment of the skull to a turtle's shell; and a puncture of it to a hole in the side of a jar. He also notes carefully the side of the brain injured.

The tenth case is of a wound through the eyebrow to the bone, with the direction to stitch the wound, this being the first case on record for stitching a wound, *i.e.*, probably 4,500 to 5,000 years ago.

The beginning and the end of the papyrus are absent. On the back are five columns of incantations, as if the scribe had been set to write them and had forgotten to finish the surgery.

(4) Chester-Beatty Papyrus No. 6, is preserved in the British

Museum, and dates from the XIXth century B.C. It has 48 sections: and contains a series of remedies and prescriptions for diseases of the anus and rectum; and it might be termed an early treatise on proctology.

(5) The Berlin Medical Papyrus is preserved in the Berlin Museum, and dates from the XIXth Dynasty. It is similar to the Ebers and Hearst Papyri, and contains 204 sections translated by Brugsch.

(6) Kahun Papyrus. Gardiner found it at Lahun in the Faiyum, Lower Egypt, in 1899. XIIth and XIIIth Dynasties, 34 sections all on gynaecology, 2160-1788 B.C. Translated by F. L. Griffiths.

(7) Petrie Papyrus. Veterinary scripts. 2160-1788 B.C. Translated by F. L. Griffiths. XIIth and XIIIth Dynasties.

(8) The London Papyrus is mainly burns and translated by Walter Wrewzinski, 1910.

*The Paleopathology of Egypt was investigated in Nubia prior to submersion by the raising of the dam at Assuan by Fouquet, Elliot Smith, Wood Jones and M. A. Ruffer. They found arthritis common, that the teeth of early predynastic peoples were good, from the coarse husky food found in the intestines. Caries followed by abscess was occasionally found—mastoid, appendicitis, Pott's disease with psoas abscess were also rarities.

About 1000 B.C. gall stones were found in a youth's body. Syphilis, cancer and rickets were unknown.

These different Egyptian papyri give us then, from at least 3000 B.C. medicine, surgery, and gynaecology, proctology, veterinary medicine, diseases of the eye, the ear, nose and mouth, diseases of the skin and the chlorosis and different phases of hookworm and other worm diseases and thus form an extensive if not quite a complete medical curriculum. Those papyri coming from the old kingdom are believed to have a considerable proportion due to Imhotep, the medical adviser, and ultimately Grand Vizier of King Zoser, a Pharaoh of the IIIrd Dynasty 2980-2903 B.C. Imhotep is supposed to have been the architect or to have obtained architects to make the Step Pyramid of King Zoser at Sakkarah. He became so famous for his medicine that he was worshipped as a demi-god for centuries and ultimately raised to full godhead as the deity of medicine. Three temples were erected in honour of Imhotep, the first at Memphis, which became a hospital and school of medicine containing a medical library of which the only book so far recovered is the Bestin Papyrus. Another was at Philae and now partially submerged as the result of raising the dam at Assuan, and the third a small one at Thebes.

The Hermetic Books of the ancient Egyptians were held by the

* The hieratic writing seems to run truly, while the Arabic causes errors to appear in subsequent copying; but the former holds still some unknown sounds.

priests and it is generally believed that medicine in the Old Kingdom was free from priestly influences and that it was the priests who introduced the magic and superstitious rites into the papyri, or added them on the back, as in the case of the Edwin Smith Papyrus.

The Hermetic Books numbered 42, the last six of which were medical. No. 37 was anatomy; 38, diseases; 39, surgery; 40, remedies; 41, diseases of the eye; 42, diseases of women.

Ebers believed that he had found the Book of Remedies No. 40.

It will be seen from this list that diseases of the eye is the only speciality among five general treatises, and is given such a prominent place because of the very large number of the cases requiring specialists to treat them. From remote antiquity, the Khamsin, a hot S.W. wind blows across Egypt for about 50 days, from mid March, and it is laden with sand. It caused an immense number of eye cases many of an obstinate and chronic nature, affecting also the nose and mouth. Hookworm disease was prevalent from drinking the Nile water, and may have had eye complication. Trachoma was also prevalent, and in the Ebers a number of preparations are given and epilation employed for trichiasis and entropion. Epilation forceps were found all over Egypt.

By our time trachoma had become such a plague, that in 1903, A. F. MacCallan was appointed to direct a travelling ophthalmic hospital, and by the time he left Egypt, 20 years later, there were 23 new units of 16 permanent eye hospitals, 5 travelling hospitals and 2 ophthalmic departments, attached to permanent general hospitals. By 1937 there were 111 ophthalmic units, including 36 ophthalmic clinics at primary government schools.

Herodotus, writing in the 5th century B.C. (484-408 B.C.) says that in Babylonia, patients were placed in public places so that passers-by could give advice as to what they or others had done successfully, because there were no regular physicians. That is the first stage of medical progress.*

He stated further that in Egypt, where medicine had begun with the 1st Dynasty of the Pharaohs, they had reached by his time, specialists for a number of diseases. He mentions also that the specialists of Egypt were so famous that Cyrus, the Great, of Persia, 560-592 B.C., sent to Egypt for a world renowned oculist. There were specialists for cataract operations.

Inscriptions demonstrate that even in the Old Kingdom 3500-2400 B.C. there were already numerous oculists. One of them is Iri shown in this picture, of which the inscription reads "The Oculist of the Court, Iri."†

* Reference is made in the "code" to bronze knives, showing that they were still in the bronze age.

† *XXV Congrès Ophthalmo.*, Livret Guide, p. 35, 1937.

The eye figures prominently in Egyptian mythology. An amulet with the image of the perfect healthy eye, blackened with kohl, made in all materials—gold, silver, lapis-lazuli, granite, porcelain, wood, etc., has been used universally throughout the ages. It is worn as a protection against the evil eye, and also that the wearer may acquire perfect sight, vigour, security, and health. There is of course a legend connected with this.

This eye is called the eye "Oudjat," and it was made the badge of the Fifteenth International Ophthalmological Congress in Egypt in December, 1937.

(*Ibid.*, p. 36.) The king wearing the high feather crown offers a pair of healthy eyes in sacrifice to the God Horus, seated on his throne. This is symbolical of the sun and the moon, and the offering of the two perfect eyes signifies that the light of the God will be unconquered through eternity. Two sacred eyes were painted invariably on coffins.

It is possible that if not penicillin, yet the Egyptians used so many dungs that they might have employed other moulds and even penicillium glaucum in their treatment as it is used to-day with such brilliant results.

It must be remembered that we owe the alphabet, mathematics, astronomy, and the measurement of time, as well as medicine to the Egyptians.

In this paper it has been shown that ophthalmology was in existence in Egypt during the days of the Old Kingdom more than 3,000 years B.C., and also in Mesopotamia between 2000 and 1500 B.C., and was the first specialism to be set up, on account of the serious results of different eye diseases which were so frequent, that oculists were required to treat and to prevent them as now from the dire results of failure, and for which they gave in their day and generation of their best, as we give still to-day of our best to advance the art and science of Ophthalmology.

Note.—During the meeting, by the courtesy of W. R. Cunningham, Esq., M.A., LL.D., the librarian of the University of Glasgow, were shown the two volumes of Ebers Papyrus, the volume of the eye section, and the two volumes of the Edwin Smith Papyrus from the University Library. The Royal Faculty of Physicians and Surgeons of Glasgow loaned *The Proceedings of the Royal Society of Medicine*, volumes VII, XVII and XIX, and demonstrations of the late Dr. James Finlayson, of Glasgow, and other volumes from the Royal Society of Medicine, London, and the Royal Philosophical Society of Glasgow, Legacy of Egypt, and of Rome and other volumes.

A REVIEW OF EYE DISEASE IN CENTRAL CHINA*

BY

G. H. PEARSON

FROM THE METHODIST HOSPITAL,
SHAOYANG, HUNAN, FREE CHINA

A RESIDENCE of 24 years in this little-known part of Free China, during which time ophthalmic work has been one of the writer's main interests, is the basis for this review.

The hospital which has grown up at Shaoyang, Hunan, during these years now has 120 beds, and a daily out-patient clinic of up to 200 patients. Of these usually 25 per cent. have been eye cases. They come to us mostly direct from peasant homes, and never having seen any other doctor. Many travel great distances along the old paths amongst the rice-fields. The climate in this part of China is moist and sub-tropical, with just an occasional winter frost.

Owing to the conditions of practice, any opportunities for laboratory work have been few, apart from a routine smear. The continuity of our records has frequently been interfered with by wars and rumours of wars, which caused sudden evacuation on at least three separate occasions. Nevertheless, records which survive show that between 1929 and 1942 we treated 1,341 in-patients suffering from trachoma. We did 1,027 operations for entropion, and 51 operations for cataract, etc. These are a sample of the numbers of cases treated.

The great bulk of our cases have always been due to the conjunctival infections and their sequelae. The treatment of diseases of the fundus, and even the prescription of glasses, have assumed a minor rôle in our work, due to local social conditions. The call for properly adjusted glasses is, however, increasing and it is now possible to get lenses ground locally by Chinese firms who understand the usual prescriptions. Amongst students especially there is a high proportion of severe myopia, often hereditary. Presbyopia has for centuries past been known and treated in China by the use of convex spherical lenses. One just goes to a shop and asks for the appropriate glasses for a person 35, 40, 50 or 60 years old, and a crudely ground lens of approximately right strength is forthcoming! Lenses of natural rock-crystal still fetch much more money than those of "mere glass"! Glasses prescribed in the old way for myopia are less satisfactory, due to the crude make of the lenses and the absence of any means of correct adjustment. Astigmatism, which is frequent, is left entirely untreated by the old methods. Strabismus of various types occurs, but there seems to be no demand for treatment of this symptom.

* Received for Publication, October 24, 1944.

A.—Conjunctival infections

1. *Acute conjunctivitis* of a type locally known as "Ho Yen" or "Fire Eye" is very common. The main symptom is a redness of sclera-conjunctival area, with soreness and stickiness of the lids. The bright red colour is very noticeable. It usually clears up under simple treatment in two or three days, or if untreated it may lead on to corneal ulceration, etc. It is also possible that some of these cases exhibit a transient temperature. A smear usually shows a few bacilli. The condition is very infectious, large scale epidemics are seen frequently in local schools, and amongst soldiers.

Our usual treatment is by four-hourly saline or boric washes, followed by mild antiseptic drops, as mercurochrome 1 per cent. or acriflavine 1/1,000. A bandage is forbidden. If ulcer supervenes, then atropine is added to the treatment.

2. *Trachoma.*—Trachoma is one of China's most pressing public health problems. It is so common everywhere that it cannot possibly be tackled by eye specialists alone. What can the 20 or 30 specialists do amidst a population of 450,000,000 people of whom every fourth person is infected? Every doctor and every trained nurse should be instructed in its diagnosis, cure and prevention.

Diagnosis.—Possibly trachoma, as seen in China, is not quite the same as trachoma as seen in Egypt or in Europe. To me in Hunan any case of chronic conjunctivitis is a suspect case of trachoma and must be treated as such. I can never tell which case of sub-acute conjunctivitis is going to become trachoma. Only after some weeks can I tell. By that time the case has either been cured, when I say it was not trachoma, or has gone on to become a typical text-book case of trachoma. So far as one has been able to get the history of these cases, they all begin as a very mild conjunctivitis, which only later becomes recognisable for what it is. There is never any pus formation. My first question therefore to every patient is "How long have you had it?" A non-purulent sticky conjunctivitis which has lasted over three weeks is considered to be a case of trachoma, and is labelled as such.

Among the cases so labelled we may then proceed to separate out:—

1. The early case, with only rudimentary follicle formation and with as yet no macroscopic pannus formation.

2. The fully developed trachoma having many soft lymphoid follicles in the upper fornix, and over the surface of the tarsal plate. They are also often seen in the lower fornix. In these cases pannus is usually becoming well developed in the upper half of the cornea.

3. The cicatricial case where the follicles have mostly disappeared and where scar tissue has taken their place. These cases usually show smooth white scar tissue in the fornix covered by epithelium, but this process taking place in the tarsal plate gradually produces incurving of the lids and the formation of entropion, with further sequelae of ulceration. At this stage we often see very intense pannus which covers and obliterates the whole cornea, and is quite impervious to treatment.

4. Cases occur which I like to call "the hard type of trachoma." In these cases the fibrous tissue, instead of being smooth and soft as above, takes on a hard nodular condition, so that the whole inner surface of the tarsal plate area becomes covered by hard fibrous nodules, separated from each other by deep trenches of conjunctival epithelium, but so closely pressed together and flattened on the surface by friction over the cornea, that they look like a tesselated pavement when fully developed. These are probably the cases called "spring catarrh" in our textbooks. To me in Hunan they definitely belong to the trachoma family.

5. A fifth development in our cases may be the formation of a plasmoma. This is a tumour of the conjunctiva apparently reported only from China. Clinically to the writer this appears to be a late degenerative condition, in an eye which has for long years been irritated by trachoma or conjunctival infections. It consists of a soft easily bleeding and friable tumour mass, lying directly under the conjunctival epithelium and often involving the whole conjunctiva. It is not encapsulated and can be scraped out with a sharp spoon, rather like herring roe. So treated it shows no malignant returns, but the scarring and loss of conjunctiva may be serious.

6. In China a pterygium very often is a late complication of the multiple irritations of trachoma, though it may in theory occur without trachoma.

In such a practice as mine in China it is necessary to regard any case which shows definite follicle formation and in which the follicles can be expressed between the finger nails as "trachoma." The development of pannus (that is of macroscopic blood vessels, first in the upper half of the cornea, then all over, finally becoming a definite layer of vascular scar tissue over the whole corneal surface) seems to be a secondary development, due possibly to the rubbing and irritation of the corneal surface by the inflamed conjunctiva, though it is regarded by some as a direct lesion produced in the cornea by the infecting tissues.

Treatment of trachoma cases.—The lymphoid follicles when once formed may continue to grow with the continued progress of the disease, or may regress as the case goes on to a spontaneous

cure. Certain it is that if these soft follicles are expressed, and a regime of mild washes with slightly caustic drops instituted, improvement is at once definite, although of course scar tissue and new blood vessels do not disappear. Expression of the follicles is usually done in the O.P.D. between one's finger nails, or if preferred between the ends of two ordinary scalpel handles. In China Knapp's roller forceps is quite useless. It is far too big and bulky to get it into these small much scarred conjunctival fornices. Anaesthesia is hardly ever used. We have no time for a general anaesthetic, and cocaine drops are of little use in such inflamed conjunctivae. At the time of expression, and also after a subsequent wash, a drop of protargol 1 per cent. is instilled. The patient is told to attend daily for about two weeks. The conjunctiva is rubbed over gently at each daily visit after dropping in the protargol, or if it is a badly inflamed case substituting silver nitrate 1 per cent. for the first few days (or copper sulphate 1 per cent.). The patient is told to wash his eye three or four times daily with boric lotion or normal saline, and to instill a drop of protargol 1 per cent. at night. There is no special virtue about these old-fashioned drops, but they do their job. I believe that there must be many other drugs which would have an equal effect, but they must be very slightly irritant as well as mildly antiseptic.

Note.—Even 1 per cent. protargol by itself is a slight irritant. If dropped at night into a healthy eye, it always produces a small discharge of mucus by the next morning. A patient might think that this was a sign that his eye is unwell, but in reality, such a slight discharge is simply due to the reaction by the healthy conjunctiva to the presence of the protargol, and it is an indication to the physician as to how these drugs produce their good effect. In my student days in England I had been taught never to use such " painful caustics as silver nitrate, copper sulphate," etc., in the human eye. My teacher was a highly respected member of his profession, but, alas, I now use them regularly. This for two good reasons: 1. The chronically inflamed eyes with which I am dealing are not sensitive to pain in the way that a normal healthy eye is; 2. I find that these drugs definitely do clear up these cases, when used as I have described. Only very rarely do I find it needful to apply a copper stick or crystal with the idea of hastening the process of cicatrisation.

Note.—The use of sulphanilamide. To me it is irrational to give sulpha drugs by mouth in these cases. We are presumably dealing with a virus disease, and viruses are not usually subject to sulphanilamide or its congeners. If, however, we have before us a late case of trachoma which has gone on to corneal ulceration and secondary infection, then sulphanilamide does have a place, but it should be applied locally. Why poison the whole body

when it is possible for us to get the action and absorption by local application? In this matter I have been working under some handicap, as during the past two years, we in Free China have been entirely cut off from all access to scientific printed matter from Europe or America, due to the blockade of China by Japan. I did, however, see one or two of the earlier articles, and was encouraged to experiment with the sulphanilamide, which was the only suitable preparation obtainable locally. I therefore began to dust pure sulphanilamide powder, every four hours, into the eyes of my patients suffering from any of the conditions for which it was said to be effective. So used it is slightly irritating at the time of application but the pain soon passes off. In trachoma cases which had gone on to ulceration of the cornea the results were very well worth while, and also in old pneumococcus ulcers, in acute gonococcus infections, etc. So soon as improvement had set in I changed the treatment to saline washes with atropine as required. Actually I should now prefer one of the newer soluble sulpha preparations which might be expected to allow of adequate absorption without the accompanying irritation.

Other treatment.—In the "hard type cases" I find all the above treatments useless. In these cases the patient suffers much from the chronic local irritation of the hard nodules rubbing on the cornea. Even the application of crude caustic has little effect on these cases and I believe that the only satisfactory treatment is the actual excision under anaesthesia of the whole diseased area, suturing the healthy conjunctiva from the upper fornix down to the edge of the wound. These are the only cases which need such radical cure, and they are not a large proportion of the whole.

Entropion.—Under this term I include all cases, sometimes known as trichiasis, etc., where one or many of the eyelashes has become turned in so as to scratch the cornea at each movement of the lid. In our clinic 99·9 per cent. of these cases are due to cicatrisation and contraction of scars left in the tarsal plate by the growth and healing of trachomatous lymphoid follicles. In our general medical and surgical clinic, these cases are more numerous than any other clinical entity! The scar tissue is actually in the tarsal plate itself, which therefore becomes curved when the scar tissue contracts. Often a slight degree of this condition may be more hurtful than when all the eyelashes are resting in a quiet row against the cornea, because the single hair frequently digs its point into the cornea, thus rapidly producing an ulcer. In treating such large numbers of entropion patients one's treatment must be as rapid and as certain as possible. After actually trying out most of the available operations, we now use almost uniformly the Hotz operation with individual slight variations to fit it to each case. Half per cent. Novocain is injected into

the lid, a strip of skin of the desired size is removed together with the underlying connective tissue in one piece, thus leaving the yellow tarsal plate showing below. A narrow wedge is then rapidly excised along the whole breadth of this plate, the underlying cornea being meanwhile protected by a plain metal shield. Stitches three or four in number are inserted, including in them if necessary the fibrous tissue on the surface of the tarsal plate. At the end of this operation the lashes should be already in their final position. A dressing is applied and the eye bandaged. On the third day, *i.e.*, after two nights, the bandage is removed, the wound smeared with vaseline and left unbandaged. On the fourth day the stitches may be removed and on the fifth the patient leaves for home cured. Time is money for these cases. They cannot afford to stay for longer grafting operations and the like. We have been getting uniformly good results from this treatment, recurrences are almost unknown, or if they do occur, it is because the original trachomatous process is still active and fresh scars have produced a fresh deformity of the tarsal plate. A further operation plus the treatment of the trachoma will cure the case. In pioneer up-country work this is an immensely satisfying little operation, especially amongst patients who are so nervous about any risk to life. One man with very little equipment can do the operation and the patient is rescued from probable blindness for life. He is duly grateful.

Pterygium.—Although not usually listed as a trachoma complication, the many cases of pterygium that we see occur almost universally in old chronic trachoma patients. Fully developed it consists of a triangular mass of vascular fibrous tissue, its apex adherent more or less to the centre of the cornea, and having a line of adhesion along one radius of the cornea until it spreads out on to the bulbar conjunctive as its base. The conjunctiva covers the whole thing except along the actual line of adhesion to the cornea. As seen here its development often begins as a small marginal ulcer. Small blood vessels grow towards the ulcer from the sclera, thus healing its outer edge. But as the cornea is avascular, the ulcer progresses centripetally towards the centre of the cornea, and the healing edge of blood vessels thus gradually follows the ulcer to the centre of the cornea, dragging with it as it goes its own covering of conjunctival epithelium. Treatment consists of treating the trachoma and ulcer if still unhealed, or any other irritating condition, such as smoky fires. We may remove the scar tissue at leisure, taking care to heal the new ulcer left by the incision so that it does not again repeat the circumference-to-centre scarring process. Such a patient must be warned before operation that the vision after operation will not be as good as before the disease process set in, due to the destruction of the surface epithelium of the cornea.

Trachoma (with its sequelae) is thus one of the greatest causes of ultimate blindness in Free China. Pannus, leucomata or scars following ulcers or entropion, and even perforation and loss of the eye are what we see in these people who are constantly coming to our clinic to see if there is anything to be done for them. I have even seen a case of mental disease as a sequela of trachoma. That was a boy with acute trachomatous disease which healed quickly but there had been several small abrasions in the corneal surface, which healed without any formation of fibrous tissue and without replacement of the small amounts of corneal tissue lost. The result was greatly reduced visual acuity due to the irregular refracting surfaces. The patient was a young student, and he was never able to accommodate himself to a life in which study and the reading of books was impossible.

B.—Other diseases

Apart from trachoma and conjunctivitis the following are always to be seen at our Shaoyang clinic.

1. *Syphilis.*—This is very prevalent amongst the whole population and is almost untreated. Whole villages of men, women and children seem to be affected, but it is certain that in many cases the course of the disease is not severe. A primary sore may be seen on the face or eyelids. Secondary or early tertiary disease shows itself as an acute iritis, which often goes on to blindness due to iritic adhesions and consequent secondary glaucoma. In children and young people keratitis punctata is frequently seen, beginning as a small pyramidal area of greyness in the lower half of the cornea. This consists of fine punctate spots if seen in a good light. There is also some redness and photophobia. It readily yields to anti-syphylitic treatment plus atropine drops. Amongst adults with late secondary or tertiary disease we see many cases of acute neuro-retinitis, which causes a gradual loss of sight without any external signs of disease. Diagnosis may be confirmed by the ophthalmoscope. The disc at first appears red and inflamed, later it is a clear cut white patch. At that stage the eye is already blind. If seen early vigorous anti-syphylitic treatment may be effectual in saving what sight still remains. Alas, in China there is no governmental provision of arsenicals and the ordinary price of these drugs on the market is prohibitive to very many of our patients. We have to do what we can for them. Such cases are sometimes very tragic, for the patient and his friends can see nothing wrong to account for the loss of sight—many Chinese soldiers have succumbed to this condition.

2. *Gonorrhoea.*—In this part of China the gonococcus is always with us. In the eye department we see it first as a frequent acute purulent conjunctivitis affecting adults by direct infection

from the genitalia. The eyelids become swollen and very painful so that the patient cannot open his eyes, and the conjunctiva is full of pus. If not attended to, the disease very early ulcerates the cornea and blindness may be complete in a day or two. This is often a soldier's disease, we have also had cases amongst careless part-trained male nurses.

The other gonococcal eye condition that troubles is ophthalmia neonatorum. The condition is preventable if the usual precautions are taken at the time of birth. (Immediate cleansing of the the eyes by the midwife, plus instillation of 1 per cent. silver nitrate drops.) Alas in China most children are born in their village homes with only the dirtiest of old women in attendance. Local superstition forbids the mother to move from her home for any cause before the baby is one month old. Such an infected child is thus usually quite blind from corneal ulceration long before it gets to hospital. Almost daily I have been seeing such babies brought up to my eye clinic! Such a blind child is not wanted. I believe that such early blindness is usually the direct cause of the death of these children in the early months of their life, due to deliberate or involuntary neglect of the child by its disappointed parents. Our reaction to this situation as an eye clinic has been to sponsor the provision of increased midwifery teaching and accommodation.

Treatment.—In all these gonococcal cases we are now using sulphanilamide powder, as described under trachoma above. In addition we use the frequent boric or saline wash, and the continuous application of cold to the lids, because *in vitro* the gonococcus is very susceptible to the effects of a cold temperature and cannot grow below blood heat. No bandage is allowed, and the pus is washed away at least every hour, the sulphanilamide being applied four hourly. In one case we attempted to use a sulphanilamide ointment, but it failed badly due to the inability of the nurses to get the ointment under the swollen edges of the lids.

3. *Measles* is very common in Hunan, and it produces not a few eye cases for us. The initial lesion is an acute conjunctivitis with photophobia. Such eyes, if neglected and not washed occasionally, easily develop a small corneal ulcer, which leads on to a leucoma scar or "white cloud" in the cornea. Very many children with severe measles recover from the disease itself after two or three weeks but are left by it in a condition of extreme weakness and disability. It is in these cases of extreme debility and under-nourishment after measles, that we frequently get cancrum oris or noma. Others of them become true cases of keratomalacia and get acute massive ulceration of the cornea. If we get these cases soon enough we try to treat the underlying

condition, giving cod liver oil and vitamins by mouth. Atropine and cod liver oil dropped directly into the eyes are also useful. Alas, in many of these children, by the time that the general condition has improved, the eyes have already become blind.

4. *Smallpox.*—In these cases we frequently see a smallpox pustule on the cornea itself. Such a pustule leaves a very dense white leucoma. Treatment is on general lines only.

5. *Acute cerebro-spinal meningitis* is frequent, and has been seen to cause blindness due to a spread of the infective process along the optic nerve.

6. *Tuberculosis* in all its forms is very frequent in this region, but we see so many other gross superficial eye lesions, that it is not often that one feels justified in making a certain diagnosis of tubercular eye trouble.

7. *Senile cataract,* and *primary glaucoma* both occur, but neither is common.

8. *Accidents* of all kinds trouble us. Most troublesome are the neglected cases of perforating wounds of the eye with prolapse of iris, which come for treatment days or months later. We thus frequently get cases of *sympathetic ophthalmia.* Our advice to these cases is complicated by local superstition, and by the fact that former anti-foreign propaganda used the slogan that " foreign doctors gouge out your eyes to make their medicine of them." Because of this we have still to move carefully. In a case where enucleation of the wounded or exciting eye may be expected to save the sight of the remaining eye, we explain all the circumstances to the patient, and to his relations, and get them all to sign a document saying that they understand the case, and that we may do what is necessary. Our young trained Chinese nurses are a great help in getting these explanations put through. More and more in recent days we are finding such difficulties are growing less, and our patients are becoming willing to accept the advice given to them.

REFERENCES

SHERE and SONDERS, B. F.—*Arch. Ophthal.*, Vol. XXV, pp. 1025-1031.
——— *Lancet*, 1939-40, quotation mislaid.
BOLDT.—Trachoma, H. and S., 1904.

ANNOTATION

Retirement of the Manager of the Journal

Mrs. H. D. Kelf, who has been manager of the British Journal of Ophthalmology since its inception in 1917, retired from her post at the end of March, 1945. Before accepting this position she had already served in a similar capacity with the *Ophthalmoscope* since its start in 1903. Thus it will be seen that she has served British Ophthalmology, and served it remarkably well, for more that forty-one years. It is fitting that we should not let her retire without thanking her for all she has done for us.

At the outset Mrs. Kelf performed her duties in London but for many years now she has been able to do her work from her own home with frequent visits to headquarters.

We doubt if readers realize what a lot of work the manager has to do. Much of it is of course routine work, but endless questions are for ever cropping up. Subscriptions have to be received and acknowledged and letters have to be written to all parts of the world. The accounts must be kept in order. The advertisements are under the general control of the manager and in early days she had to direct the wrappers in which the journal was sent out each month.

All these years she has kept a watchful eye on our expenditure and there is no question but that the soundness of our financial position is largely due to her. Nothing has been too small to escape her business eye. It has been the Journal's great good fortune to have had so loyal a manager all these years and Mrs. Kelf will carry with her, in her retirement, the thanks and good wishes of us all.

COUNCIL OF BRITISH OPHTHALMOLOGISTS

Annual Report, 1945

THE Council presents its report for the year 1944-45.

The Council records with regret the death of Mr. Harrison Butler, a permanent member.

The Council's reports upon the Regionalisation of the Ophthalmic Services of London, and upon the Ophthalmological Aspects of the White Paper were duly forwarded to the proper quarters.

The Council's scheme for a higher diploma in Ophthalmology was forwarded to the Royal College of Surgeons and has been accepted. The arrangement of details has been postponed until after the inauguration of the Faculty.

The Consultant's panel selected by the Ministry of Labour has been twice convened by the Ministry.

The Council of the Royal College of Surgeons have elected Mr. George Black as co-opted member of their Council to represent Ophthalmology.

The Council has prepared a memorandum upon a post-war National Ophthalmic Service, which is available for the use of the Council of the Faculty when required.

The Council produced a memorandum upon Post-graduate Teaching and Research which was widely circulated, and has received favourable comment from the recipient bodies.

A sub-committee has been elected and is now considering the question of the definition of industrial and educational blindness.

The Council has sponsored the inauguration of a Faculty of Ophthalmologists, as announced in the press. The response has been good, and there are up to date some 220 members and associates. The Council has been elected by ballot, and met on Thursday, April 12, for the first time. The Council of British Ophthalmologists has handed over its records to the new Council.

As in the past, the expenses of the Council have been met by contributions from its members. In this connection, the Council of the Faculty will be asked to consider the desirability of re-imbursing the members for expenses incurred in connection with the Faculty.

ABSTRACTS

I.—MUSCLES

Guibor, G. P. (Chicago).—Recession of the inferior oblique muscle from the external rectus approach. *Amer. Jl. Ophthal.*, Vol. XXVII, p. 254, 1944.

Guibor describes an operation for recession of the inferior oblique muscle. A vertical incision 8 mm. long is made through the conjunctiva 3 mm. from the outer canthus over the external rectus muscle. The external rectus is divided behind its insertion. The inferior oblique is freed from its attachments to the external rectus and inferior rectus. Recession stitches are inserted in the muscle belly midway between its origin and insertion. Illustrations show both ends of the divided muscle sutured to the sclera at the appropiate site for recession; a space on the sclera separating the ends.

H. B. STALLARD.

II.—ORTHOPTICS AND REFRACTION

(1) **Lancaster, J. E. (San Francisco).—Orthoptics: education in binocular skill.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 463, 1943.

(1) **Lancaster** comments that orthoptics is not exercising of the ocular muscles, nor is it primarily designed to straighten the eyes. It is the education of a patient to use both eyes together for comfortable binocular vision. The emphasis in such training is the skill in the use of unskilled neuro-muscular co-ordination.

No amount of work or orthoptic equipment is of any value to the patient unless both eyes are fixating on the maculae.

It is necessary to recognise when a patient has achieved all that may be reasonably demanded of him and not to keep him working at tedious tasks beyond his ability.

H. B. STALLARD.

(2) **Linksz, A. (Hanover, New Hampshire).—Objectives of orthoptic examination and treatment.** *Amer. Jl. Ophthal.* Vol. XXVI, p. 552, 1943.

(2) **Linksz** in discussing his belief in the value of orthoptics makes a plea for the functional approach to habit. He describes the technique of examination and treatment. He also explains that the scepticism of Chavasse and others about the value of orthoptics is based on their anatomical conception of "conditioned" visual reflexes passing down definite pathways.

H. B. STALLARD.

(3) **Burian, H. M. and Ogle, K. N. (Hanover, New Hampshire).—A study of the aniseikonia in a case of increasing unilateral index myopia.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 480, 1943.

(3) **Burian** and **Ogle** made a study of a case of increasing unilateral myopia due to nuclear sclerosis of the lens to show that refractive anisometropia is accompanied by aniseikonia. This case was contrasted with one having a similar degree of anisometropia not due to unilateral nuclear sclerosis. No significant image-size difference was measured in the latter and the clinical evidence tended to show the myopia to be axial in nature. Thus it seems that no *a priori* conclusions can be made as to the aniseikonia present in any given case of anisometropia.

H. B. STALLARD.

(4) **Beach, S. J. (Portland, Maine).—Anisocycloplegia.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 522, 1943.

(4) **Beach** applies the term anisocycloplegia to a caprice of cycloplegia in which one eye is affected by the cycloplegic drug to a considerably greater extent than the other eye. Different methods

of administration of the drug do not appreciably or consistently alter the situation. It is revealed by tests for depth of cycloplegia and by comparison with results of non-cycloplegic procedures.

H. B. STALLARD.

III.—MISCELLANEOUS

Green, T. (Saint Louis).—Severe kerato-iritis due to Brucellosis: successful treatment with Brucella abortus vaccine. *Amer. Jl. Ophthal.*, Vol. XXVI, p. 491, 1943.

Green describes the case of a young woman who developed bilateral iritis and vascular keratitis. Agglutination tests for Brucella abortus and Brucella Melitensis were negative. Clinically, the condition was regarded at first as tuberculous. Tuberculin therapy, typhoid-paratyphoid, heat therapy, blood transfusions, neo-arsphenamine, gold treatment, U.V.L. baths, sulphanilamide, thyroid and riboflavin; and locally mydriatics, miotics, short-wave diathermy and radium (β radiations) all failed to improve the condition.

A presumptive diagnosis of brucellosis was made, and a course of Foshay vaccine led to remarkable clearing of both corneae and great diminution in vascularization. Optical iridectomy and cyclodialysis of the right eye reduced the tension and greatly improved vision. The left vision did not improve after operative intervention.

H. B. STALLARD,

BOOK NOTICES

The Relation between Illumination and Visual Efficiency—the Effect of Brightness Contrast. By H. C. WESTON. Industrial Health Research Board Report. H.M. Stationery Office, 1945. Price 2s. 6d.

In a paper to the "Illuminating Engineer" in 1934, Mr. A. W. Beutell suggested that if the relationship could be ascertained between the characteristics for satisfactory visibility—*e.g.*, size, contrast, brightness—then the illumination suitable for the performance of any task should be capable of computation. In 1935 Mr. H. C. Weston published a report on the relationship between illumination and size. In the present report he deals with the relationship between illumination and contrast of brightness. It has been submitted to the consideration of the Physiological Committee of the Illuminating Engineering Society.

Contrast of two brightnesses (B_1, B_2) can be expressed by difference ($B_1—B_2$), ratio (B_1/B_2), or ratio of ($B_1—B_2$) to B_1; and

since any brightness, B_1 is the product of the illumination and the reflection factor, e, of the illuminated surface, contrast can also be numerically expressed by $(e_1-e_2)/e_1$ if the surfaces receive the same illumination.

The test tasks required the discrimination and cancellation of all the Landolt rings having a given gap orientation on specially prepared test sheets. Space does not permit of detailed description of the computations of the assessments of performance—suffice it to say that every care was taken in the physical measurements and in the statistical estimation of results. The following are the chief conclusions.

(1) With the same illumination, whatever its value within the range considered, the performance of tasks differing in contrast, *i.e.* in the value of $\left(\frac{B_1-B_2}{B_1}\right)$, appears to be unaffected by this difference, providing the size involved is large (6 mins.) and the contrast does not fall below a certain value.

(2) When size is smaller, performance increases with increase of illumination in a different way, and reaches a different maximum, for different contrasts, *i.e.*, the relation between performance and illumination depends on the contrast presented by the task. The illumination for maximum performance varies inversely and the maximum performance varies directly with the contrast. Thus, with equal illumination, however high its value, equal performance of tasks presenting different contrasts cannot be obtained.

(3) Performance also depends on the contrast presented by the task, even if different contrast tasks are given different illuminations such that each task presents the same absolute brightness difference. But, at a certain brightness difference, depending on size, performance reaches, or very closely approximates to, its maximum for each contrast within the range studied. Further, it is shown that when size is small (about 1 min.) the relation between relative performance (*i.e.*, actual performance with any contrast expressed as a percentage of the maximum performance attainable with that contrast) and brightness difference is the same whatever the contrast of the task. It is also shown that, above a certain relative performance, the relation between this variable and brightness difference, for sizes up to 4·5 mins., is not much affected by the contrast of the task. Hence, it is possible to predict the illumination necessary to give approximately a certain percentage of the maximum performance possible with a task presenting any given size and contrast, within the limits considered, from the relation

$E_1=\frac{E(\rho_1-\rho_2)}{\rho_3-\rho_4}$, where E is the known illumination required to give the same percentage of the maximum performance possible with a task of that size presenting contrast depending on reflection factors ρ_1 and ρ_2.

(4) Experiments with a "reverse" contrast of low order, having the reflection factor of the object greater than of the background, show that performance and relative performance are better at both the same illumination and the same brightness difference than for a similar "normal" contrast.

While it may be doubtful whether Mr. Beutell's suggestion of a reliable integration of the many variables—physical, physiological, and psychological—of visibility is possible, there can be no doubt that Mr. Weston's researches on the relationship of illumination to size and to contrast of brightness are extremely valuable.

Reconstructive Surgery of the Eyelids. By WENDELL L. HUGHES, New York. Illustrated. London: Henry Kimpton, 1943. Price, 21s.

The material of this book formed the subject matter of a thesis for the Author's admission to the American Ophthalmological

Society, and consists of an account of the evolution of methods for reconstructing the lids—a procedure known as blepharopoiesis (Gr. blepharon, eyelid, poiesis, creation) together with a description of his own method. The latter is what will chiefly interest practising Ophthalmic surgeons. The steps of the operation, which is done in three stages, are so clearly described and illustrated that there should be little difficulty in carrying them out, and one feels that the author has performed a valuable service in devising and describing so lucidly an operation which will be of considerable service in plastic surgery.

The historical portions of the book are interesting, but consisting mainly of outmoded methods, will not be read with the same attention as that given to the sections dealing with modern technique, where there is much valuable information to be found. Some of this might have been given in more detail, for example, the description of "pregrafting" a skin flap with mucous membrane from the cheek. When another edition of this book is called for, it would be helpful if the author, so to speak, separated the wheat from the chaff. Thus, one portion of the volume could be reserved for full descriptions of modern methods of proved efficacy, instead of having them scattered throughout the book among accounts of methods which have only historical interest. There are allusions to the existence of 7 cinema films illustrating cases and procedures mentioned in the text, and one hopes that some day these may be available in this country. The idea seems to the reviewer to be an excellent one, and might be copied with advantage by writers of other books dealing with practical procedures. If recorded on 16 mm. film, a collection of reels could be kept at various libraries, and be available for use with home projectors to readers of the books they illustrate.

Industrial Ophthalmology. By HEDWIG S. KUHN. 294 pages, 114 illustrations including 2 colour plates. Published by Henry Kimpton. Price 32s. 6d.

Although many monographs have been published on industrial ophthalmology, this volume is the first comprehensive treatise to be written on the subject. Its appearance will, therefore, be welcomed by those whose advice is sought on the ocular aspects of problems in industry. What might be described as the text on which this book is written is contained in the following quotation from Harvey Bartle: "First, if defects exist, relate them to placement. Second, if defects exist, correct them if possible. Third, if it is not possible to correct these defects, find that spot in a plant where that individual can do the job in spite of his defects." This statement seems a fairly obvious one, but its application by the ophthalmologist is not quite so simple, because it presupposes a knowledge by him of the visual demands of various branches of industry, which Mrs. Kuhn insists can be obtained only by personal

experience of the tasks which the workers have to perform. The profession of industrial Ophthalmologist is, therefore, one demanding a considerable experience of manufacturing processes in addition to a knowledge of ophthalmology, and of the protective mechanisms which can be employed when doing work hazardous to the eyes. The field is a large one and the scope of this book can be gauged by the fact that it treats the following aspects of it in considerable detail. Visual testing in industry, correction of visual defects for job, visual skills, industrial eye injuries caused by solid bodies, eye protection, recent developments as related to industrial problems. There is also an appendix which, among other information, gives a useful method of appraisal of loss of visual efficiency. The method is somewhat complicated, but has the advantage that it includes in addition to loss of visual acuity, the effects of loss of field, and of muscle function.

It seems possible that the demand for industrial ophthalmologists will increase, and it is to be hoped that the supply will prove adequate. The fact that a recent survey of some 9,000 employees showed that 10 per cent. had serious eye defects is sufficient justification for the establishment of this speciality within a speciality.

Mrs. Kuhn, her co-workers and publishers, are to be congratulated upon the production of an admirable volume, and of one which may well serve as the standard text book on this subject for some time to come.

NOTES

Death

As we go to press we learn with deep regret of the death of Sir James Barrett, of Melbourne. We hope to publish a memoir in a later issue.

* * * *

Col. Derrick Vail's return to the United States

COLONEL DERRICK VAIL, A.U.S.M.C., Senior Consultant in Ophthalmology, European Theatre of Operations, assigned to Major General Paul R. Hawley's staff, returned to the United States shortly after Christmas, fully expecting to come back upon completion of a thirty day mission. He writes: "A few weeks after my arrival in the States I was asked to become the Chief Consultant in Ophthalmology to The Surgeon General and assigned to Washington. I am therefore unable personally to say good-bye to the many delightful and cordial friends I have made in the ophthalmic group in the United Kingdom, and to thank them for their friendships and the many thoughtful and kind things they did to make my stay of twenty six months among them as pleasant and as profitable as could be under the circumstances. I wish particularly to thank

the officers and members of your ophthalmic societies for the great privilege of being permitted to attend your meetings, listen to the many splendid scientific papers and to take a small part in the discussions. It was also a great privilege to live in your midst and to share some of the common dangers and hardships you are enduring with such inspiring courage and dogged bravery. I am filled with the utmost admiration and respect for your collective ability to carry on and conduct scientific work of the highest order in spite of bombings, destruction, personal inconvenience and loss, bereavement, short rations, difficult transportation, blackout, shortage of heat and a thousand and one difficulties. You have every excuse to slacken in your scientific production. The effort of getting through the day's life and work is enough of a task for average men. If the word "Supermen" had not gathered to itself a derisive meaning due to the unspeakable Hun, it might be applied to you without gilding the lily. I speak for my fellow ophthalmic medical officers in the E.T.O.U.S.A. as well as for myself when I shout "Long live British Ophthalmology!" I expect to return as a civilian some day in the peaceful future and see you all once more. It will be a happy time for me. In the meantime au revoir and best of luck to you all."

* * * *

The Royal Eye Hospital: Clinical Society

A MEETING will be held at the Royal Eye Hospital on May 25 at 5 p.m. Dr. T. H. Whittington will speak on alternating strabismus.

* * * *

University of Glasgow Department of Ophthalmology. Whitsun Term 1945

IN May a series of meetings will be held in the Department on Wednesdays at 8 p.m. The general arrangements will be similar to the series held last year. Tea will be served after the paper and a discussion will follow. The meetings will be open to all medical practitioners and senior students interested in Ophthalmology.

May 2, Dr. G. H. Bell—"Vision and Sound in Cinematography"; May 9, Mr. J. S. Tough—"Plastic Surgery of the Eyelids"; May 16, Miss D. E. Feather—"Indications for Orthoptic Treatment of Squint"; May 23, Dr. R. W. Pickford—"A new approach to Defects of Colour Vision"; May 30, Mr. W. B. Inglis Pollock—"Arabian and Mediaeval Ophthalmology."

* * * *

Special Notice

WE are asked by the Ministry of Information to state that the fact that goods made of raw materials in short supply owing to war conditions are advertised in this journal should not be taken as an indication that they are necessarily available for export.